THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIX. No. 1503.] LONDON, MARCH 1, 1892. [44TH YEAR. PRICE 6d.

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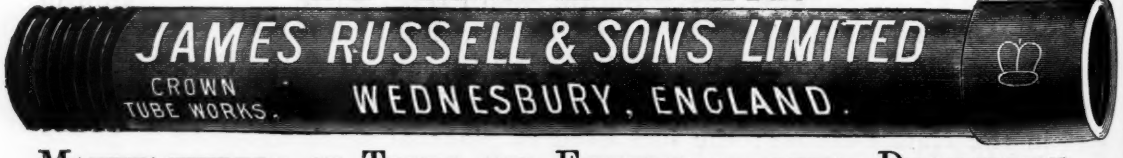

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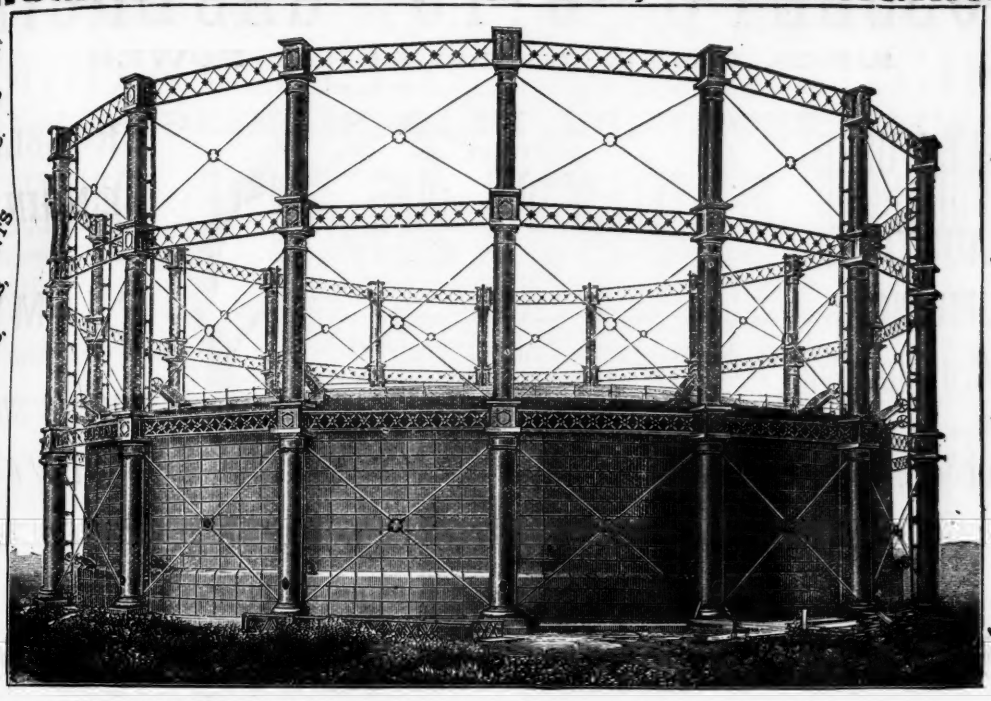

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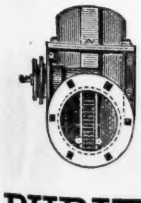

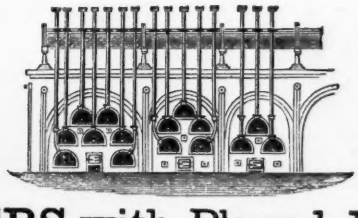

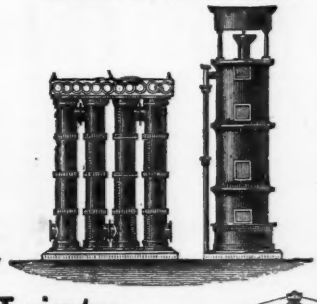

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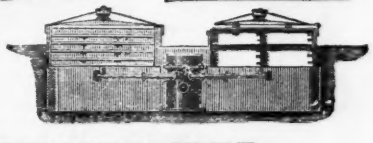

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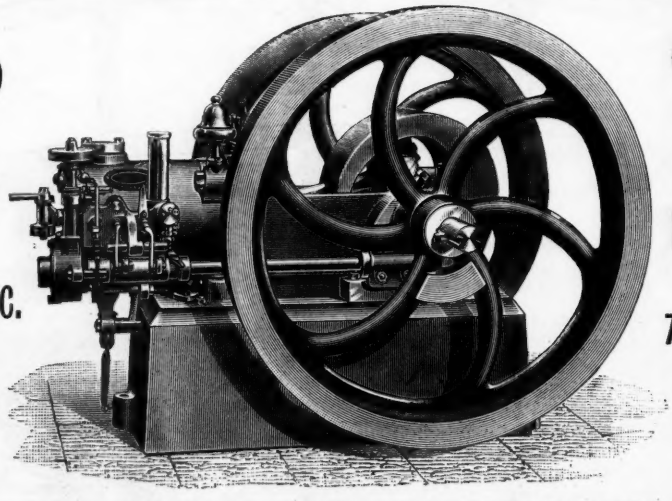

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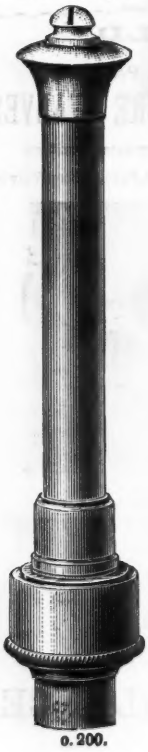

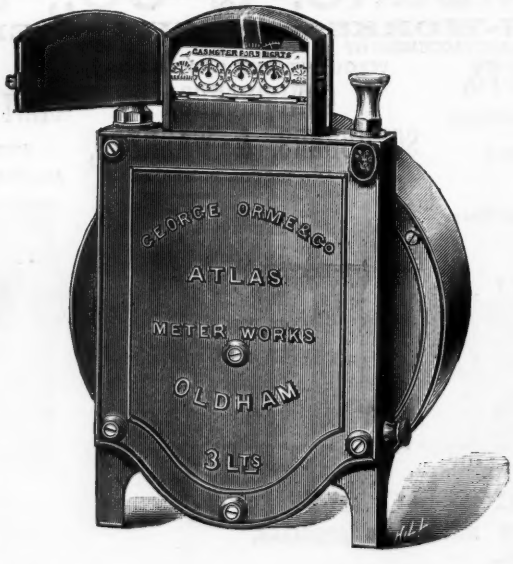

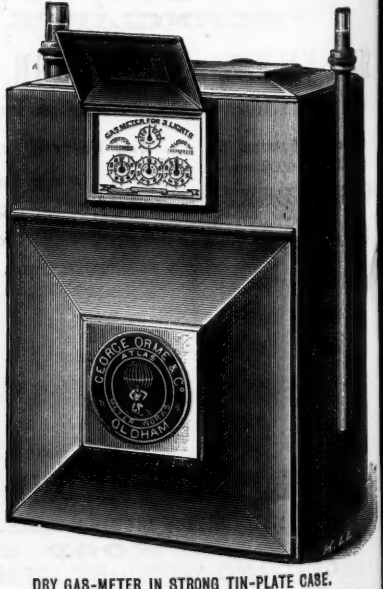

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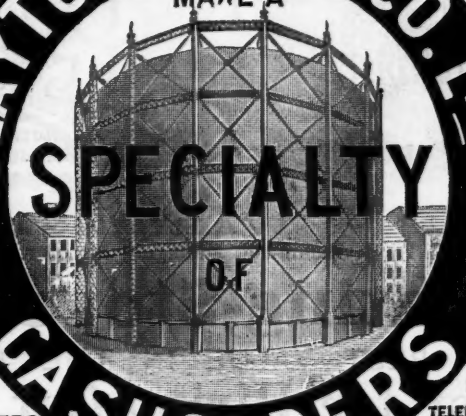

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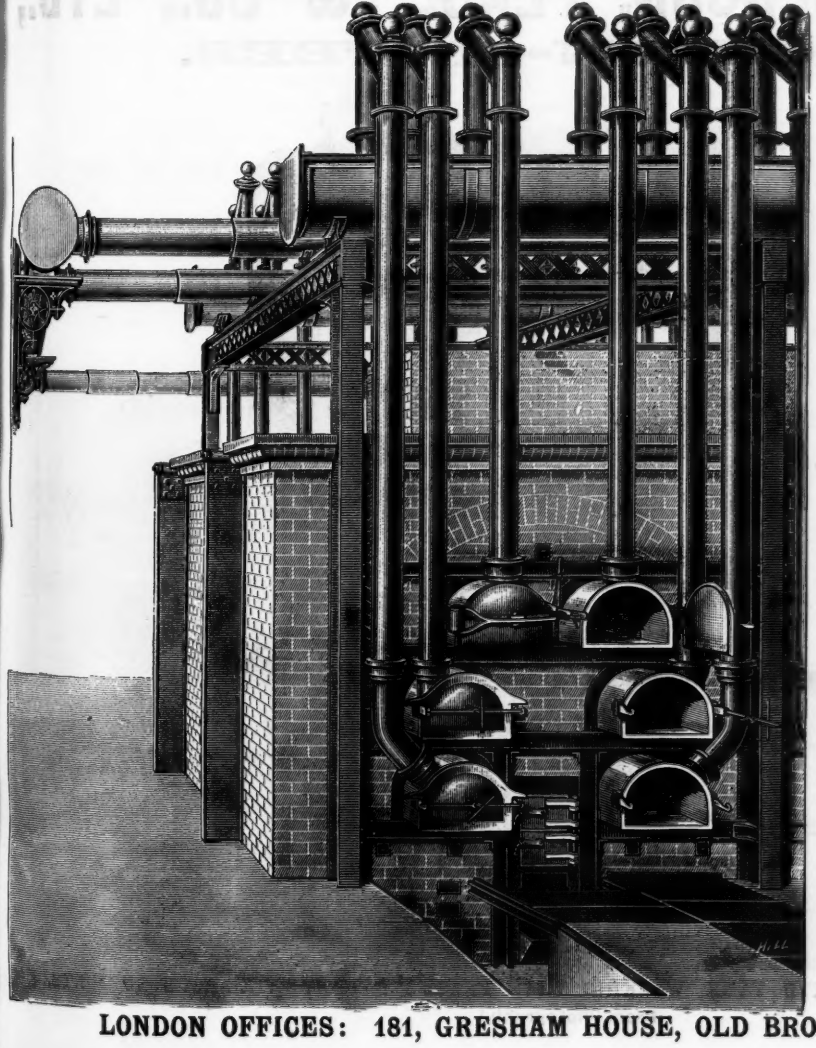

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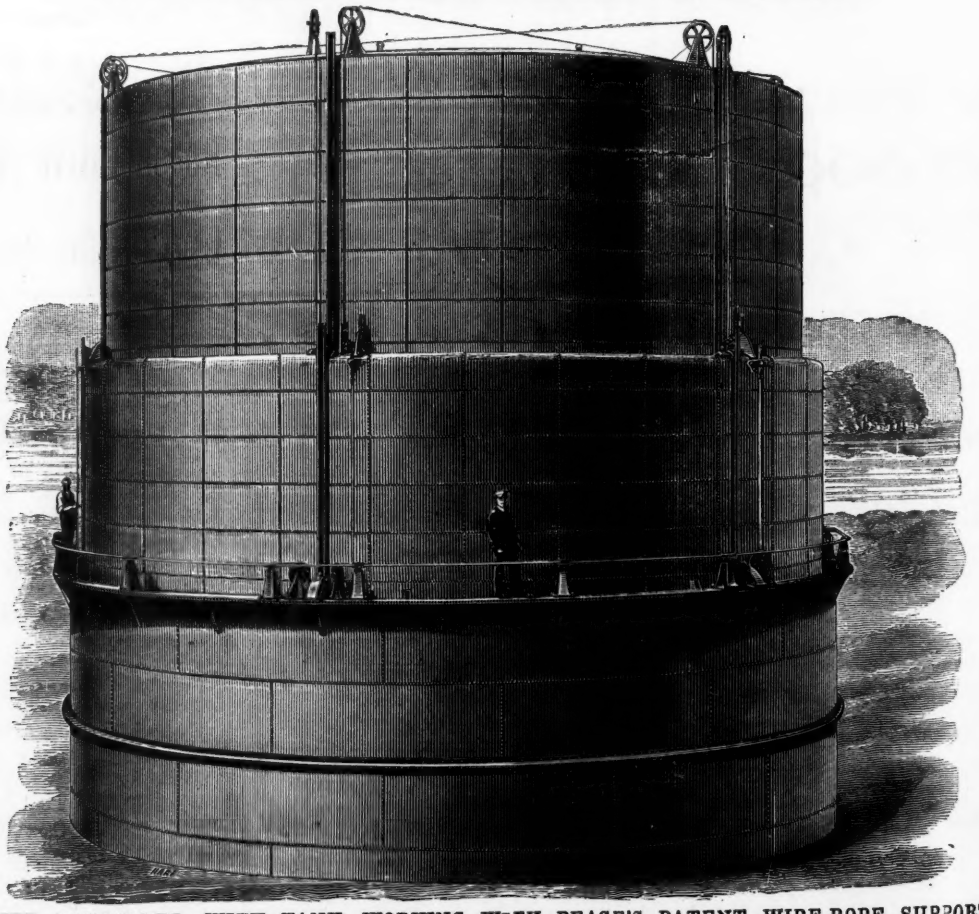

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FURTHER INFORMATION UPON APPLICATION.

PRICE'S PATENT HYDRAULIC MAIN.

The construction of this Appliance will be readily understood from the annexed description extracted from the JOURNAL OF GAS LIGHTING for June 16, 1891 :—

The patentee proposes to remove the hydraulic main from over the retort-benches to the front of them, so as to permit of the ascension-pipes being carried direct into it from below.

The gas from the retort enters the hydraulic main by a vertical pipe issuing above the water-line; and over this pipe is a cover or inverted thimble of block tin or iron dipping into the liquor contained in the main. This thimble is perforated, so that the moment the gas enters the box it lifts it to the water-level, and acts automatically according to the flow of the gas. By this means the back-pressure is taken off the retorts; and the patentee claims that he thus gets "a perfect washer through the whole hydraulic main, and extracts the tar before it enters the condenser." The tar is taken from the bottom of the hydraulic main; so that the gas is only in contact with ammoniacal liquor. A tank is placed above the level of the hydraulic main containing ammoniacal liquor or water; and this is conveyed and distributed in the hydraulic main, being worked over again at will so as to add strength to the liquor and keep the hydraulic cool.

Fig. 1 is a longitudinal sectional elevation of the hydraulic main, showing the connection of the ascension-pipes therewith and with the various parts of the apparatus. Fig. 2 is a cross sectional elevation.

The hydraulic main A is placed at any convenient position in front of the retorts above the mouthpieces; and the pipe B is connected with the retort, and the pipe B^1 with the hydraulic. These pipes are connected together by a removable socket, constituted of two parts, fastened together by flanges, so as to form a stuffing-box for the gland which maintains a sealed connection between the two pipes, and affords flexibility for erection and renewal, as well as freedom for expansion and contraction. The portion B of the ascension-pipe issues into the main above the water-level W with a simple open end. Over this

Fig. 1.

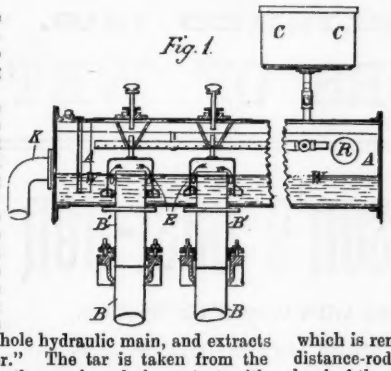
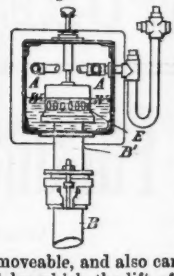


Fig. 2.



open end is placed the bonnet or cap E, which has the effect of deflecting or turning the gas downwards in the direction of the arrows. The gas enters the main A through holes in the bonnet, when it is lifted by the force of the gas—as in the case of the right-hand bonnet in fig. 1; the left-hand bonnet being shown in a position where no gas can be discharged into the main. This mode prevents back-pressure, or limits it to any desired amount, according to the weight of the bonnet or the pressure placed upon it in any mechanical manner. The bonnets are guided in their lifting action by a rod passing through a hole in a plate attached to the cover, which is removeable, and also carries the stuffing-box for regulating the distance-rod by which the lift of the bonnet may be regulated to the level of the water W. The guide-rollers keep the bottom of the thimbles steady; and air chambers assist to balance their weight.

Should anything go wrong with any of the ascension-pipes, says the patentee, it is only necessary to lift the cover, replacing it by a sealing cap, which is of a size over its flange to just fit in place when the working of this particular ascension-pipe is stopped during repairs, and which may go on without further interference with the working of the other ascension-pipes or the hydraulic main itself. The suspended partition leaves an opening at the bottom, through which the tar has to pass to the passage of K, where it is drawn off. By this means the heaviest tar gravitates, and escapes by this passage, so that the main is kept nearly empty of tar. The plan permits of the gas being broken up and washed more thoroughly by the arrangement of the perforated pipes communicating with the vessel C containing water or ammoniacal liquor, which passes along the pipe, and is sealed against the passage of gas by the syphon pipe shown.

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Messrs. T. PIGGOTT & CO., ENGINEERS, SPRING HILL, BIRMINGHAM.

The Patentee will be pleased to wait upon Engineers, with Model and Plans, and give all information required.

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Dublin, 1865. Paris, 1867.

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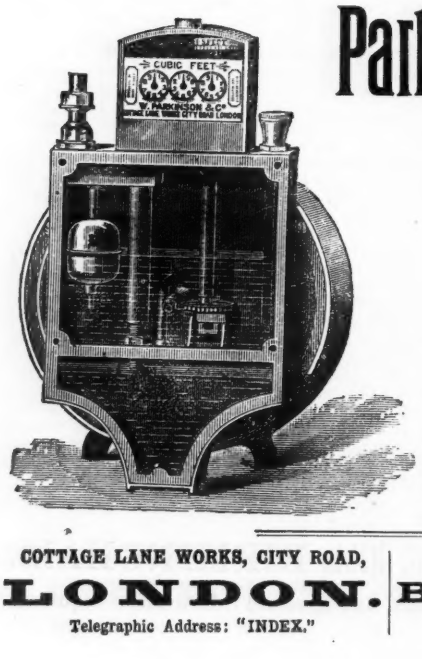

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CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

A Portentous Conspiracy . . . 383
The Chartered Assessment Appeals—Another Adjournment . . . 321
Standards of Light . . . 384
The Meeting of the Manchester District Institution . . . 385

WATER AND SANITARY AFFAIRS—

The Birmingham Water Scheme and the Water Supply of the Metropolis 386

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market . . . 386
Electric Lighting Memoranda . . . 386
Stevenson and Burstal on the Metropolitan Water Supply . . . 387
The Crystal Palace Electrical Exhibition—Fourth Notice . . . 387

NOTES:—

Preservative Paints . . . 389
Lord Rayleigh on Heat-Engines . . . 389
Breeze Concrete . . . 389

COMMUNICATED ARTICLE:—

Lighting. Part IV.—The Photometry of Lighting. By W. H. Y. Webber 389

TECHNICAL RECORD:—

Manchester District Institution of Gas Engineers—Annual Meeting in Manchester—
General Report . . . 390
Inaugural Address of Mr. Charles Armitage . . . 391
Wright's Letheby-Bunsen Photometer . . . 395

PARLIAMENTARY INTELLIGENCE:—

House of Lords—Progress of Bills . . . 396
House of Commons—Progress of Bills . . . 396

LEGAL INTELLIGENCE:—

High Court of Justice—Chancery Division—Kirkleatham Local Board *v.* Stockton and Middlesbrough Water Board . . . 396
High Court of Justice—Queen's Bench Division—*In re* an Arbitration between the Kirkleatham Local Board and the Stockton and Middlesbrough Water Board . . . 396
County of London Assessment Sessions—The Gaslight and Coke Company's Assessment Appeals . . . 397
West London Police Court—Water Companies' Powers of Cutting Off Supply . . . 398

MISCELLANEOUS:—

Sheffield United Gas Company—The Half-Yearly Report and Accounts . 399
Meeting of the Croydon Commercial Gas Company . . . 399
Meeting of the Barnet District Gas and Water Company . . . 399
Meeting of the Cork Gas Consumers' Company . . . 400
Coventry Corporation Gas Supply—The Powers of the Gas Committee . 401
Provincial Gas and Water Companies . . . 401
Heywood Corporation Gas Supply—The Growth of the Undertaking . . 403
The Electric Lighting Question at Cambridge . . . 404
Metropolis Water Supply—The London Water Question and the Birmingham Water Scheme . . . 404
Notes from Scotland . . . 405
Current Sales of Gas Products . . . 406
Coal Trade Reports . . . 406
Gas and Water Companies' Stock and Share List . . . 407

PARAGRAPHS.—Mr. W. J. Russell, 385—Death of Herr Julius Ginzel, 385—Presentation to Mr. S. W. Durkin, 385—South-West of England District Association of Gas Managers, 385—The Official Nominations for the Incorporated Gas Institute, 385—Presentation to Mr. T. W. R. White, of Sherborne, 386—The Southern District Association of Gas Engineers and Managers, 386—The Salford Gas Frauds, 387—Chemical Society, 388—The Rotherham Gas Managership, 388—Richmond and Co., Limited, 388—Increasing Use of Gas for Industrial Purposes, 388—Presentation to Mr. J. Duxbury, of Darwen, 388—Death of Mr. E. Fox, 395—Resignation of Mr. W. Blackledge, 395—Sales of Shares, 398—The Estimates for the Birmingham Water Scheme, 398—The Lead-Poisoning Question at North Bierley, 398—Gas-Engines for Electric Lighting in Theatres, 403—New Water-Works for Marlborough, 403—The Liverpool Corporation and the Electric Lighting Company, 403—St. Helens Corporation Water-Works, 404—Birmingham Electric Supply Company, 404—Railway Carriage Lighting, 404—Extension of Electric Lighting at Blackpool, 405—Increased Storeage for the Southend Gas Company, 405—The Supply of Hydraulic Power, 405—Gas Cooking in Infirmaries, 407—Proposed Extension of the Rainhill Gas and Water Works, 407—Bristol Gas Company, 407—Sale of Stock in the Cambridge Gas and Water Companies, 407—Yorkshire Water Gas Company, 407—Tottenham and Edmonton Gas Company, 407—A New Coast Light, 407—Gas, Water, and General Investment Trust, Limited, 407—Smokeless London, 408—A Large Steel Pipe Contract, 408—The Worcestershire County Council and the Birmingham Water Scheme, 408.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 1, 1892.

A Portentous Conspiracy.

IT is not a little remarkable that while there is actually a Labour Commission sitting for the purpose of inquiring into the relations subsisting between capital and labour in every industry of the kingdom, the thoughts of those who take most interest in this matter are not centred upon the proceedings of the Commission, but upon the living movements of the working world. It is doubtless instructive to read the stories told before the Commission by "all sorts and conditions of men;" but it is difficult to resist the intrusion of a suspicion that much of what they so patiently hear is merely "cross swearing." Moreover, it is all more or less history; and men in business care little for history except for the light which it can throw upon the affairs of the moment, and the guiding which it can supply for dealings in the future. It is very interesting, after a fashion, to hear how certain past strikes came about; but just now the working world is more exercised to learn something reliable about a peculiar kind of strike which is threatened for the middle of the current month. There has been a portentous amount of talk and of newspaper writing about a proposed suspension of coal mining; and last week every news sheet in the country was full of the "coming coal crisis," which is to be brought about by the action of the Miners' Unions in stopping the output of coal for a period variously stated as a week or a fortnight, commencing on the 12th inst. In the *Daily News* of Friday last, it was categorically stated that a quarter of a million of men owning allegiance to the Miners' Federation would stop working on the day named; and it was expected that the Durham and Northumberland miners, who belong to another Union, would do the same, albeit acting independently of the Federation. The object of this proposal—the initiative in which, be it observed, is ascribed to the men—is stated to be the prevention of the fall in coal prices at the pit's mouth which is actually in progress, and which if not arrested will infallibly entail a reduction in miners' wages. It appears that in Durham and Northumberland the necessity for a reduction of wages is not disputed, but there is a difference of opinion between the employers and the men as to the amount. Hence the distinction between the views taken by the Federation and National Union men respectively is that, whereas the former contemplate stopping the output in order to prevent any reduction of wages, the latter are not so confident that the proposed week's or fortnight's "play" will be so effectual, and will only resort to it if the employers insist upon making the full reduction of wages of which notification has been given.

Frankly, we do not know what to believe of all this. If there is anything in the rumours that have taken such seeming solidity in the Press, the coal-owners will be found to be at the bottom of it. The proposed suspension of work may be a conception of the men's leaders; but we have a shrewd suspicion that it would suit the book of the owners better than that of the Unions. There is never a possibility of understanding the "true inwardness" of these movements in the coal-mining industry. We are not alone, however, in suspecting the complicity of the owners in this hazardous project; for we find in one newspaper of Friday last these significant words: "The "Miners' Federation have counselled a general stoppage "of work for one or more weeks. They are proceeding "on the theory that a lessening of the output will stop "the fall (of wages) by preventing that competition which "a decline in trade always creates. That may prove a "delusive and shortsighted view, as artificial checks "cannot, in the long run, control such a necessary as "coal, and in the meantime other of our national "industries will suffer. However that may be, the "present movement on the part of the men appears to "have the sympathy, if not the active support, of many "of the coal-masters." Just so. The masters—nominally so-called—or some of them, and the men, are engaged in a conspiracy to artificially force up the price of a necessary of life; and this in an age which has its Labour Commissions, and in a nation which has been dosed with Political Economy for at least three generations!

Now let us see how this precious scheme is expected to work. Our contemporary the *Daily News*, which never willingly says hard things of men with so much voting power as the miners—especially with a General Election so near—timidly asks, if the price of coal is to go up, who is to pay the difference. "Not the ordinary householder," says the agent of the Miners' Federation, "unless by "some means or other the middleman gets more than his "share." The admission is significant; and all we need add to it is the remark that, unfortunately for both producers and consumers, the middleman is generally able to take very good care of himself. But again let us hear the Federation leader. He says: "We do not want "to punish the public; there is no reason why we should. "The people who *should* pay the difference are the coal-"owners' principal customers—namely, the Railway and "Gas Companies." The italics are ours. The spokesman of the Federation went on to state that housekeeping consumers pay for their coal a price sufficiently high to remunerate both the owners and the miners, but that "the "Railway and Gas Companies get coal at their own prices.

"They are too strong for the coal-owners. Buying coal on "their terms, they put into the pockets of the shareholders "money which should reward the mining trade." It seems a pity the Editor of the *Daily News* did not take the trouble to inquire as to the truth of this fancy picture, at least with regard to the part played by the Gas Companies, of that eminent authority to whom he has gone on other occasions for information of the kind. The Secretary of The Gaslight and Coke Company could tell where the money has come from to satisfy the shareholders; and he might ask in return what has become of the increased price of 4s. and 5s. per ton which these purchasers who are declared to be able to command their own terms—the Gas Companies—have paid over to the coal-owners during the last two years.

It is hardly necessary, however, to trouble the representatives of the Gas Companies to supply material for the demolition of the fallacies which the coal-mining conspirators are so laboriously building up, with the complaisant assent of politicians who cannot bring themselves to admit that 250,000 voters, more or less, may conceivably make egregious fools of themselves. The ordinary householder is not to suffer from the miners' folly in playing catspaw to the owners, is he not? Then what are we to understand by this report in the *Daily News* of the day following that which saw the publication of the reports we have already mentioned: "Yesterday it became generally "known on the Coal Exchange that the North of England "miners intended to adhere to their decision of ceasing "work on the 12th of March. The excitement in London "in consequence was considerable; and the price per ton "on all qualities was raised 1s., while several members of "the Coal Merchants' Society stated that it was certain "a further rise would take place on Monday next. . . . "The owners of collieries took the first step towards "sending up the prices; and this falling upon the mer-"chant, the merchant in his turn consequently puts it "upon the consumer. The consumer, therefore, is the "person by whom the full brunt of the coming upheaval "will be mostly felt, and by none more acutely than the "artizan and the unskilled labourer." It is also reported that in London it is "the merchants"—*i.e.*, the middlemen —"who will thus gain by the advanced prices when the "cessation of the output at the collieries takes place."

Surely, it might be thought, there is for the Federation men warning enough in all this of the share they will be forced to take in this public robbery. It is they who will be accused of doing it all, while the middlemen and the coal-owners will put the reward into their pockets. They will have the blame and the loss, while the employers and agents will take all the plunder. If they are only one-half as wide awake as they claim to be, they will take to heart the lesson of the too grasping coal merchants, and baulk the designs of these "forestallers," as they would have been called in the days when the Political Economy of which we are all so proud had not been dreamt of. We preach Political Economy now-a-days; but some of us are very ready to dispense with it when there is anything to be gained by so doing. In the bad old days of the Tudors, the enterprising gentlemen who are now so pleasantly and profitably engaged in turning the rashness of the Miners' Federation to their own advantage would have run considerable risk of losing their ears. Things are much better managed in our times; and "regraters" can victimize poor miners and starve struggling consumers without incurring any danger of personal inconvenience.

Happily, however, these plotters and schemers can still be punished through the most tender part of their anatomy —their pocket. It is not too late for the miners to stay their course towards self-destruction. Much mischief has been done already; but infinitely more will be avoided if the miners shake off the toils in which they have become entangled. It will be better for them to take their 7½ per cent. reduction of wages now than to make matters worse by first upsetting all the minor trades of the country, merely for the purpose of enriching a few middlemen. So far as the liability of Gas Companies to pay the supposititious increase in the value of coal is concerned, we frankly declare that the notion is a delusion and a snare. If the agent of the Miners' Federation knows his trade, it is inconceivable that he can have spoken in good faith the words put into his mouth by the newspaper correspondent. Gas manufacturers buy all their coal by contract, often covering far too long periods; but rarely for shorter times than one year. Although they can be, and in some cases are, victimized by astute and unscrupulous persons in the coal trade, temporary disturbances of the coal market seldom materially affect gas companies or gas committees of corporations. It sometimes happens that when coal-owners are reproached with the high price of their commodity, and the absence of any corresponding increase in the rates of wages they pay, the ready answer is given that these high selling prices are illusory because much of the output is sold to Gas Companies, &c., under contracts made when coal was cheaper. But did anybody ever know of an instance where a coal-owner continued to pay high wages in a falling market, because he had a contract running at famine rates? All these things are for the different parties in the coal industry and the public generally to consider. This article should find its way to every miner's club-room and Trade Union office in the Black Country, so that the men may not go wrong, if they must act foolishly, with their eyes shut to the circumstances. We hardly expect Trade Unions to be considerate of the public interest. The Tyne strike shows how little the slaves of one Union care for the suffering their action may inflict upon other workers for daily bread. But that Trade Union officials should play the game of the middlemen—that miners should throw away their bread to make coal dealers fat—is, as Talleyrand would say, "worse than a "crime; it is a blunder."

The Chartered Assessment Appeals—Another Adjournment.

ONCE more the finish of the great assessment case is deferred—this time until next Saturday week, by which day it is hoped on all sides that what Sir Peter Edlin, Q.C., calls a "compendious statement" of the effect of his judgment may be ready for the correction of the multitudinous Metropolitan rate-books affected by these proceedings. It was hoped, rather than believed, that last Friday would have seen the last of the meetings in this matter at Clerkenwell. But the day was not lost after all; for, after a little preliminary debate between the Chairman and Mr. Littler, Q.C.—not devoid of acerbity—Sir Peter Edlin settled the last protest advanced on behalf of the Company by the use of that "soft answer" which proverbially "turns away wrath," and it thereafter appeared that the appellants had wisely decided to make the best of the situation; and to assist the respondents in working out the application of the judgment in the prescribed manner. It must have been rather galling for Mr. Littler and his learned friends to be satirically complimented by the Solicitor-General upon the setting in of "sweet "reasonableness" in their councils. But the combative Mr. Danckwerts did not happen to be present, and Mr. Littler had no fight left in him; so the future conduct of the business settled down, after the appellants had uttered a final complaint of having come off worse than the Company on the other side of the water. The general acceptance of the principle of the judgment, however, did not remove all the uncertainty from its application; for all the parishes involved in these appeals do not occupy the same footing with regard to the rating of the hereditament. Some parishes have stations and unproductive mains within their borders; while others harbour only directly-productive works. Of course, every parish wants to adopt the principle of valuation or of apportionment most profitable to itself; but this eclecticism is sternly discouraged by Sir Peter Edlin, who insists upon the adoption of a uniform way of treatment of this most complicated case. He sees that the Company's back is broad; but he will not have it unduly loaded. In order to facilitate the final apportionment, the Chairman suggested that debateable questions of detail might be left to the arbitrament of a single independent valuer, or of two; while the Solicitor-General, for his part, offered to see the Company's Accountant if there should be any hitch in the progress of the settlement. After a great deal of discussion, most of the points respecting which difficulties might be expected to arise were fairly disposed of; and the parties adjourned with the consciousness, that, although the case had had another costly "squeeze," the end is now in sight.

Standards of Light.

THE Standards of Light Committee are meeting regularly and have succeeded in arriving at a general conclusion respecting the work of their precursors in the field, which

is the best promise of their being able to do something new and valuable upon their own account. The inclusion in the Committee of gentlemen who have not hitherto been identified with photometrical work has at least one advantage—it ensures the re-examination of all the data for the accepted conclusions of the technical experts, and thus avoids that "taken-for-granted" style of doing business which committees composed wholly of experts are apt to fall into, with the result that, sooner or later, when scientific opinions take a fresh colour, the results so hastily arrived at need explanations which are not always forthcoming. Thus, it will probably transpire, when the Committee come to issue their report, that almost their first task has been to decently inter the parliamentary standard candle, while retaining the name and the average quantity of light as the unit for the more exact photometry of the future. How the unit is to be represented is one question, and its exact value is another. There have been several substitutes for the parliamentary standard candle, some of which, as Mr. Vernon Harcourt's pentane flame and the Methven slot, have come into considerable use. The question, "What "is a candle?" however, like the historic query, "What "is a pound?" is not to be answered off-hand. The new Commission may, by a single vote, carry the recommendation that the average light of a parliamentary standard candle shall be the unit of light for all photometrical purposes; but then comes the responsibility for fixing what is meant by the term. It is the commonest experience of physical experimenters with standards of light, that they first have to calibrate their working unit; for it by no means follows that a philosophical instrument is always perfect and fit for use. It has been suggested that, when the Committee have satisfied themselves that the average light of the parliamentary standard candle can be reproduced at will, they should seal up the remainder of the purchase of candles with which the decision has been come to, and build them up in some safe place for the benefit of posterity. At all events, the determination of the equivalent of the standard candle can hardly be made with too much care, whatever may be the shape which this equivalent may ultimately take. It may be pentane; but a good deal will have to be said and done before every member of the Committee shall have put his hand to the final report on this most interesting and important investigation.

The Meeting of the Manchester District Institution.

The members of the Manchester District Institution of Gas Engineers met on Saturday under the presidency of Mr. C. Armitage, of Lancaster, who succeeds Mr. T. O. Paterson, of Birkenhead, in this honourable, but rather onerous, office. We publish the presidential address in another column. This composition covers a good deal of ground; and the author has one or two things to say in it which should interest a wider audience than that which listened to him last Saturday. Mr. Armitage is a practical man in the good sense of this much-abused term. He has ideas of his own, and he puts them to the proof of working; and then he tells his professional brethren all about it. One of the subjects to which Mr. Armitage, as an experienced coal distiller, has devoted particular attention, in connection with his gas making at Lancaster, is condensation. He begins his study of the condensation of gas with the hydraulic main, in regard to which, and the foul gas main, there have been held, as he says, many wrong opinions. The difficulty about the old practices of uninstructed gas managers was, in truth, to discover where these were wrong, and why; for of systematic investigation of the results of treating the gas in any particular way there was little or none. Consequently, a man would persevere for years in draining all the benzene out of his gas, and never know what mischief he might have prevented by a very simple alteration of the pipes. It is pleasing to hear a gas manager stand up, as Mr. Armitage does, for naphthalene, which, as he says, is one of the most valuable things to have in gas—provided, we may add, that it can be made to stay in it. Naphthalene in mains and services, in the objectionable form of a solid deposit, is eminently an example of "matter in the wrong "place." There is no difficulty in retaining the naphthalene in rich gas; but it is the "14-candle men" who feel the worst that misdirected naphthalene can do. Mr. Armitage had something novel to say about the advantage of keeping gas warm in a foul main falling towards the hydraulic—the heavy tar from the latter being, of course, separately removed. His arrangement is so simple and easily applied that, if it only succeeds elsewhere as well as it has done in Lancaster, this modification of condensing plant should become popular. The subject of purification was also discussed by Mr. Armitage in an original way. He has strong views, moreover, upon the best way to deal with ammonia and the other bye-products. On the whole, this Manchester address contains a good deal of profitable matter which gas managers in every part of the kingdom will do well to consider with care. The Manchester District Institution are to be congratulated upon securing such a valuable and suggestive composition for their Transactions. The other business of the meeting included Mr. Newbigging's paper upon "Management," of which it is only necessary to say that it belongs to a class of essays which the universally respected author has made his own.

Mr. W. J. Russell, Secretary of the Croydon Gas Company, has been appointed a Director of the Carshalton Gas Company, (in accordance with the wish of a very large majority of the shareholders, expressed in votes obtained by ballot), to fill the vacancy at the Board caused by the death of Mr. Charles Newton, the Chairman.

Death of Herr Julius Ginzel.—News has just reached us from Vienna of the death of Herr Julius Ginzel, whose writings on gasholder construction, &c., have been mentioned from time to time in our columns. The deceased had a thorough knowledge of the principles of engineering, and wrote very clearly on any subject with which he was dealing.

Presentation to Mr. S. W. Durkin.—A presentation of an interesting character took place last week at the Southampton Gas-Works; the Manager (Mr. S. W. Durkin) being the recipient. It consisted of a series of photographs of the works and staff; there being twelve pictures in all, well mounted and framed in oak. In the centre was a photograph of Mr. Durkin, who has been in the Company's service for 39 years, and has occupied his present position for upwards of a quarter of a century. The senior foreman (Mr. John Dear) made the presentation; and, in a few well-chosen words, explained that it was in recognition of Mr. Durkin's services in their midst, and the consideration which the men had always received at his hands. He asked Mr. Durkin's acceptance of the photographs as a token of their esteem. In reply, Mr. Durkin said he had the greatest pleasure in accepting the gift, especially as it was a spontaneous action on the part of the men at the works. He thanked them for the presentation, and for the assistance they had always rendered him in the discharge of his duties, especially through the winter months.

South-West of England District Association of Gas Managers.—The next meeting of this Association, which, according to custom, should be held on the 8th inst., has been postponed to April 12. So many of the members have recently suffered from sickness, that the Committee considered this step to be advisable. By the kind permission of the Directors, the meeting will be held in the Board-room of the Bristol Gas Company, at Canons' Marsh. The whole of the arrangements are not yet completed; but it is understood that the Association will receive an official welcome from Alderman J. W. S. Dix, the Chairman of the Company, and from the Mayor of Bristol (Dr. Highett). The President, Mr. D. Irving (the Engineer of the Stapleton works of the Bristol Gas Company), will deliver an Inaugural Address; and Mr. Charles Richardson, C.E., Engineer and originator of the Severn Tunnel, has promised to contribute a paper descriptive of the undertaking; and it is proposed to arrange a visit to the tunnel and pumping works at Sudbrooke on the day following the meeting, under the guidance of Mr. Richardson; so that altogether there is a good prospect for a useful and enjoyable meeting.

The Official Nominations for the Incorporated Gas Institute.—An imperfect version of some of the business transacted by the Council of the Incorporated Gas Institute at their meeting held last week having leaked out, we are requested, in order to prevent misapprehension, to state that the following arrangements have been made for filling some of the principal offices which will fall vacant at the end of the current administrative year. Mr. Harrison Veevers, the Senior Vice-President, having immediately after the Carlisle meeting expressed his desire that the Council should not nominate him for the presidency, as his business engagements would prevent him from devoting the necessary time to the duties of the chair, it was deemed desirable to request one of the Past-Presidents to return to office for 1892-3. Mr. Denny Lane, of Cork, was accordingly communicated with, and consented to be nominated if the Council were unanimous in desiring him to take the position, which, it is hardly necessary to add, was the case. Mr. John West, M. Inst. C. E., of Manchester, and Mr. Robert Mitchell, of Edinburgh, will be nominated the Senior and the Junior Vice-President respectively. The Honorary Secretary (Mr. W. Longworth) has also signified his intention of retiring at the end of his present year of office; but no nomination for the post has yet been decided upon.

WATER AND SANITARY AFFAIRS.

THE Birmingham Corporation Water Bill has excited a considerable amount of attention in a circle of which the London County Council may be described as the centre. Sir John Lubbock, fearing lest London should for ever be debarred from drinking the peaty waters of the Elan and the Claerwen, recently conferred with Mr. Chamberlain, and succeeded in persuading that gentleman to obtain a postponement of the second reading of the Birmingham Bill, so as to allow of time for a friendly conference. If this truce had not been secured, there would evidently have been decided opposition in Parliament to the Birmingham scheme. The Corporation of that city, therefore, lost nothing by delay. In the first place, Sir John Lubbock obtained a gathering of Metropolitan Members of Parliament, and representatives of sundry County Councils in the Home Counties, when a Committee was appointed to confer with the representatives of Birmingham, in order, if possible, to arrive at some amicable arrangement. On Thursday the conference took place, when it was pleaded, on behalf of Birmingham, that an increased supply of water for that city was a matter of urgency. London, it was argued, could get plenty of water from the coveted area, after Birmingham had been fully supplied. With this explanation to guide them, the Committee proceeded to draft certain clauses, intended to protect London from any damage by the Birmingham scheme. If these clauses were agreed to, the Committee were prepared to recommend that the Birmingham Bill should not be opposed. The proposals of the Committee were to be laid before another general meeting of Metropolitan members and County Councillors, to be held yesterday afternoon. But it will be a little strange if this Birmingham Bill is allowed to proceed, while a Royal Commission on the Metropolitan Water Supply is pending. One of the instructions to be given to the Commissioners, as set forth in the recent letter addressed by Mr. Ritchie to Sir John Lubbock, contemplates the possibility of a source of supply being sought outside the Thames and Lea watersheds. On this subject, Sir Matthew White Ridley's Committee of the past session made a distinct representation that Parliament, before granting any powers for further encroachments upon fresh areas of supply, should consider the possible requirements of the Metropolis and other large centres of population. It would seem, therefore, that Parliament ought to wait for such information as the Commission can obtain before deciding on the merits of the Birmingham Water Bill. If that measure may be proceeded with, it will strengthen the plea of the London Corporation that their Water Bill should also receive attention. Yet, if two such Bills are to be made the subject of debate, as capable of passing into law, it would seem that the labours of the Royal Commission can possess little practical importance. In opposition to the plea of urgency for the Birmingham scheme, the prospect has been held out that the Royal Commission will simply be composed of a few experts, and that they will make short work of their inquiry. Still it has to be remembered that the Water Companies have not yet been heard; and they cannot fail to produce an immense amount of evidence, differing widely from that with which the public have been entertained for some years past. The fringe of a great subject is all that has yet been touched. As for the Birmingham scheme, some doubt is thrown in certain quarters upon the suitability of the water for drinking purposes. It is apparently open to doubt whether the Elan and the Claerwen would furnish an acceptable supply for London, and at all events some of the Birmingham people seem to have no desire for it.

Presentation to Mr. T. W. R. White, of Sherborne.—The Directors and a few shareholders of the Sherborne Gas Company last Wednesday presented some silver plate to their Manager (Mr. T. W. R. White), in recognition of his 25 years' successful supervision of their works.

The Southern District Association of Gas Engineers and Managers will hold their annual meeting at the Holborn Restaurant on Wednesday, the 9th inst., when the President (Mr. A. Dougall, of Tunbridge Wells) will deliver his Inaugural Address. Only a few other matters—consisting of the election of new members and the reception of the Committee's report—will occupy attention; and at the close of the business, the members will dine together.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 407.)

THE past week opened with a rather better show in the direction of firmness in most of the markets; but nothing much came of it. Although most of the elements which, under ordinary circumstances, go to make strong markets and good business were fairly in existence, yet, somehow or other, there is a great dearth of business, and prices can only just hold their own. Seeing the strength of the Bank, and the cheapness and prospective cheapness of money, one might fairly expect something better than this *quasi*-stagnation; but it does not come. What oppresses everything and everybody is still the fear that troubles are ahead, and that the "arrangements" made to remedy the financial position of certain shaky institutions in the last twelve months or so have only postponed, and not averted, the inevitable. The Gas Market meanwhile has been tolerably active, considering the general slackness. The chief feature in it is the very large proportion of transactions in secured and preference issues, even after making allowance for the natural demand for choice stocks for investment purposes when money is abundant and speculation is in abeyance. The tendency was good all round, and most of the leading undertakings show a little advance in quotation. Gaslight "A" was only moderately dealt in; the last prices being not quite the best of the week. The debenture, preference, and limited issues were largely dealt in, and showed considerable firmness; but the only change in quotations was an advance of 1 in the 4½ per cent. debentures. South Metropolitans were not very busy, but were very firm; but all three classes of stock come out a little higher upon *ex div.* adjustment. Commercials have been very little touched. The Directors announce a reduction in the rate of dividend to 13 per cent. on the old stock, and 10 per cent. on the new. We feel assured that this is a highly prudent step, seeing that the Company, like the other Metropolitan undertakings, have not for some time past been earning the amounts they have appropriated. A moderate dividend, well secured, is the best; and a Company that keeps this in mind, and in practice, stands firmest in the market. Business in Suburbans and Provincials has been very quiet; but they are all firm. Brentfords and Bromleys are fractionally higher. The tendency among the Continentals was also favourable; and Imperial has regained the points it lost in the preceding week. Of the rest, nothing has moved but Bombay, which receded ¼—the rate of Indian exchange having fallen to the lowest point reached. Water has been very quiet; and prices, though not much changed, are looking downwards.

The daily operations were: Gas opened well on Monday, and remained steady and unchanged. On Tuesday, the course of business was much the same for the leading issues; but Bombay fell ¼, and West Middlesex Water dropped 1. Wednesday was extremely quiet, and the only feature was a rise of 1½ in Imperial Continental. New River fell 2½. On Thursday, activity was renewed; but quotations underwent no change. Friday was moderately active, and also produced no changes except those due to *ex div.* adjustment, which were all favourable. Saturday's business was about as usual; and the only variation was a rise of 1 in Gaslight 4 per cent. debentures.

ELECTRIC LIGHTING MEMORANDA.

The Affairs of the Westminster Electric Supply Corporation—The Cork Gas Company's Abandonment of their Electric Lighting Scheme—The Choice of Motors for Central Lighting Stations—The St. Pancras Electric Lighting Scheme.

THE Westminster Electric Supply Corporation occupy a very good position among the Metropolitan electric lighting companies; their district being second only to that of the St. James's Company for eligibility, while really surpassing it in area. The Directors' report on the past year's working claims that a substantial profit has been made after allowing a fair amount for depreciation, and writing off a proportion of the preliminary expenses and suspense account. The report also states that the number of 8-candle power lamps on circuit increased during the year from 12,000 to 67,500; while applications have been signed for 5083 more, and there are 89 miles of copper mains in the district. The gross revenue of the Company for the year was £19,455; and the net profit, which was carried forward, was £3160. The capital sunk in the business amounts to £329,400; so that it is evident that a great deal more work will be required to be done before a good dividend is earned. There are three stations, actual or prospective; and the Directors will naturally be anxious to get these in full work for the money already provided for capital purposes, which is supposed to be enough to complete the producing power to the total of 295,000 lamps. It is illustrative of the conditions under which a company of this kind has to work, that the current which they sold last year for £19,000 only cost £8713 to produce and distribute. All the rest of the debit entries in the revenue account are for administrative and general expenses. If it could be supposed that the latter are at their maximum, the Company might hope to do all future extensions of their supply at a rapidly increasing profit. Professor Kennedy, the Company's Chief Engineer, has reported to the Board that no

great economy in the cost of producing electric light is to be looked for; and it is clear from these accounts that it is not in this direction that the Board must look for dividend, if they are ever to make one—of which, it is only fair to state, there is reasonably good promise.

It is announced in a paragraph of the recently published report of the Directors of the Cork Gas Company, that, in consequence of the unexplained opposition of the Corporation of the city to the application on behalf of the Company for a Provisional Order for electric lighting, this intended enlargement of their responsibilities has been dropped for the time being. The matter was mentioned at the general meeting of the Company; but very little additional information respecting the policy of the Board was allowed to transpire on this occasion. The Directors said that, although the opposition of the Local Authority would not necessarily hinder their obtaining the powers sought, they preferred not to "antagonize" the Corporation. Something was said at the meeting about the Company having desired a "monopoly" of electric lighting, such as they practically enjoy with regard to gas supply; but the net outcome of the local disagreement is that the interesting experiment contemplated by Mr. Denny Lane will not now be entered upon. On general principles, we cannot profess to be sorry for this result. We have never favoured the idea of gas companies entering upon electric lighting ventures, and did not approve of the project of the Cork Gas Company. At the same time, we acknowledged that there is something to be said for the particular variety of electric lighting speculation contemplated by Mr. Denny Lane, of distributing the electricity by means of gas-engine power; so that if a gas company is ever to be considered as justified in undertaking electric lighting, it must be when gas is used in generating the power at the central stations. Whether Cork is or is not a convenient locality for repeating the experiment claimed to be so successful at Dessau, must be a question for settlement on the spot; but, on the whole, we never thought the action of the Gas Company in this regard very well advised. However this may be, the problem has ceased for the present to possess any practical interest. It may be revived next year; but meanwhile we should strongly advise the formation of an independent Company for making the venture.

Our contemporary the *Electrical Review* is greatly exercised on the subject of the best method of providing power for central station work. It is all very well to talk of the superior economy of large steam-engines of the compound condensing type; but the exigencies of central station working forbid the employment of such motors, which cease to be economical the moment the demand for power falls below the maximum load. The high-pressure, high-speed engine is preferable when only a small amount of work has to be done; but the over-multiplication of motors must be guarded against for several reasons. Where to draw the line has not yet been settled. Our contemporary admits that "probably a maximum of economy is reached in the case of the gas-engine, where, immediately the engine stops running, all consumption ceases." To this admission, however, is added the rider, in depreciation of the gas-engine, that "at present questions of power, size, and space absolutely prohibit its use for central station purposes." Is this so really? How about the case of such a central station concern as that of Kensington, where the average output for the year is only 12·8 per cent. of the maximum. The engineer of the station observes that it looks ridiculous to keep all the paraphernalia of the station going to turn out perhaps only one-half per cent. of the maximum load. In view of these conditions, it strikes us that those who have affected to despise the gas-engine would be well advised to reconsider the question.

The first section of the St. Pancras Vestry electric lighting scheme has been completed and put to work—just in time, it will be remembered, to get into trouble in connection with the coal porters' strike, which came when the central station was short of fuel. By suitably humiliating themselves before the belligerent coalies, however, the parish electricians succeeded in keeping their boilers going. The Regent's Park station of the Vestry has been described and illustrated in the *Engineer*, from which we gather the materials for this notice of the plant. With regard to the lighting, we have independent sources of information, and have no hesitation in describing it as making a very poor show in the streets already given up to the tender mercies of the Committee. Nor shall we be contradicted when it is known that the Brockie-Pell arc lamps—good enough, so far as they go—are spaced, for the sake of economy, at distances of from 160 to 245 feet apart. The electrical plant of the station is good of its kind; the current being supplied by Kapp dynamos driven by Willans and Robinson triple-expansion engines. There are eleven of these to serve the estimated maximum requirement of 10,000 incandescent lamps of 16-candle power, and 90 arc lamps of 10 ampères each; so that if the designer has erred at all, it is not on the side of over-concentration. The Vestry are reported to be vastly well satisfied with the result of their electric lighting speculation up to date. Let us hope the satisfaction will continue. At present, however, they are their own largest customers.

The Salford Gas Frauds.—An official intimation has been received from the Home Office that Samuel Hunter, late Manager of the Salford Corporation Gas-Works, will be released from custody at Portland prison on the 18th inst.

STEVENSON AND BURSTAL ON THE METROPOLITAN WATER SUPPLY.*

The professional position occupied by the authors of this concise treatise on the Metropolitan Water Supply gives especial weight to anything they may advance on such a subject. Adopting a purely impartial standpoint, Mr. Stevenson and Mr. Burstal nevertheless speak with freedom and independence, and give the reader the benefit of their judgment on several important points. The value of the constant service system is strongly insisted upon, providing it is accompanied by proper regulations, duly enforced. The experience of provincial towns is cited to show that companies are not only equally able with corporations to undertake the efficient management of water-works with a constant supply, but have even taken the lead in so doing, "though the London Companies lag far behind." It is described as "disappointing" that, after the lapse of twenty years, not more than 65 per cent. of the whole of the houses served by the London Companies are receiving a constant supply, and at the same time the diminution of waste is scarcely perceptible. "Firmer management on the part of the Companies" is demanded, so as to secure the integrity of the fittings. To this we may reply that the Companies have met with small encouragement from the authorities in their efforts to extend the constant service, and to enforce regulations that should accompany it. If due economy were observed, there is no doubt that a little more than 20 gallons per head daily would suffice for the wants of the population served by the London Water Companies. Under such circumstances, the present supply would suffice for a population of 10 millions. With respect to the control of the supply, the authors of this pamphlet favour the idea of an amalgamation of the existing Water Companies; but beyond this they suggest the formation of a compact Water Trust, as tending to produce still greater economy. In making these and other suggestions, the two Engineers are influenced by the state of public opinion, which appears "rightly or wrongly" to demand some change in the existing arrangements. On the watershed question, it is remarked that the necessity for looking further afield is not a matter of urgency, though it might be wise to exercise some precaution, seeing how rapidly every area from which a supply could be drawn is being appropriated. Other matters affecting the main question are likewise discussed; and a quantity of valuable information is presented with much lucidity in a surprisingly small compass. The book deserves careful reading at the hands of all who are interested in the subject of the Metropolitan Water Supply; and its perusal may even serve a yet wider purpose, as with respect to the functions of the Local Government Board.

THE CRYSTAL PALACE ELECTRICAL EXHIBITION.

Fourth Notice.

The last article concluded with a reference to what was intended to be a commanding feature of the display of electric lighting at the Crystal Palace—the great screen of incandescent lamps erected by the Edison and Swan United Electric Light Company at the end of the North Nave, which, according to the "advance notices" obligingly published by some of the newspapers that have a leaning towards the electric lighting interest, was to be a most magnificent spectacle. In the catalogue, this exhibit is described as a "novel combination of incandescence electric lamps, in the form of a screen, filling up the entire perpendicular space of the Nave of the Crystal Palace, containing nearly ten thousand incandescence lamps. The lamps are arranged to be illuminated in various groups by a series of circuits. These separate circuits will be thrown in and out of contact at certain times. One of these circuits represents a fountain with changing colours. The screen will be illuminated for one hour during each evening; and during the last quarter of an hour 200-horse power will be employed in making the illuminating effects." This work of united English and American electrical science and art took a long time to get ready, and was one of the last exhibits to be recorded as complete in this most unpunctual of shows. Now that it is finished (and displayed, as per programme, every evening), the most favourable thing we can say of it is that the credit of the exhibitors, and indeed of the whole exhibition, would have been higher if it had never been completed at all. Even the *Electrical Review* admitted some weeks ago that the great screen of incandescent lamps was not very effective, which we claim as supporting our more candid judgment of the affair as being the most wretched of failures. There is, to begin with, no particular reason why a "screen" of 10,000 lamps should rank as more convincing evidence of the triumph of the system of lighting to which they belong than 10 lamps. It should, however, be possible to arrange illuminating effects with 10,000 lamps which would be pretty to look at; but this is exactly where the Edison and Swan people have so lamentably failed. Their big "screen," when it does not merely carry the name of the firm in coloured

* "Metropolitan Water Supply. Considerations affecting the Adequacy and Control of the Water Supply to the Metropolis." By E. H. Stevenson and E. K. Burstal (MM. Inst. C. E.) London: Walter King; 1892.

lamps—no very startling object—has the appearance of a very ugly and badly-arranged illumination device in Vauxhall lamps; and we have no hesitation in averring that the skilful pyrotechnists of the Palace—Messrs. Brock and Co.—would lose their appointment instantly if on any "firework night" during the season they were to put up such a poor, thin, broken-down "set-piece" as this grand effort of the Edison and Swan Company actually is. So much for the "Ediswan" screen. It is an eyesore in the Palace, and an occasion of scoffing to the London public who know what Brock or Pain can do with fireworks of a less "scientific" character.

The plentiful lack of the sense of the fitness of things which is such a blot upon the lighting exhibits generally has at least one of its sources at the head-quarters of the lamp manufacture. The stall of the Edison and Swan Company, which is immediately underneath their "screen," contains specimens of the productions of the firm, which include incandescent lamps of all kinds and forms, and fittings for use with the same. Here may be seen the flame lamps which make so much of the "artistic" lighting shown at the Palace appear ridiculous to the thoughtful observer; while the high price of lamps with fancy bulbs explains the origin of the coloured glass bead jackets which some exhibitors are driven to use in order to impart variety to the light-effects shown by them. There is a "sweet simplicity" about the system of business pursued by this monopolist Company. They have only one price for all descriptions of ordinary lamps, of from 1 to 16 candle power. These are all 3s. 9d. each. Even miniature and surgical lamps of glow-worm power are the same price. The figure runs as high as 30s., however, for a nominal 1000-candle power lamp, which is not often asked for, we fancy; though there must be a large trade in 25 and 50 candle lamps at 4s. or 5s. each. There is a case of Thomson-Houston lamps exhibited in another place, but not for sale, which illustrates the nature of the change that will come over the incandescent lamp trade in this country when the Edison and Swan patent expires.

The Edison and Swan stall shows how, in the application of incandescent lamps for lighting apartments, departure from the most rudimentary fitting may cause offence. Here may be seen the combination of a plain, stumpy bracket, which might carry a gas-burner, with a shade made from a sea-shell—a more incongruous mixture never occurred to the most Bœotian designer of the age of Churchwarden-Gothic. As we have already hinted, however, if we were to go through the exhibition only with an eye to these sins against taste and common sense, it would be difficult to pass any stall without saying something uncomplimentary of its contents. The case may be summed up in a sentence: Neither lamps nor fittings show any real improvement upon 1882; and where there is any difference, it is quite as often for the worse as for the better, We remember that ten years ago the Edison exhibit contained a beautiful pendant of wrought brasswork upon a floral pattern, sprinkled over with incandescent lamps. There is nothing in the present show better than that early example of incandescent lighting, and much that is vastly inferior to it; but the greatest deterioration is to be seen in the most prominent exhibit of the Edison and Swan Company.

Habitual visitors to the Crystal Palace will remember when there used to be a fountain in a sunk basin in the middle of the Centre Transept, between the Handel Orchestra and the great stage. This fountain has been covered over for many years—the site being wanted for a band stand; but it is now opened up again, and the fountain plays every night. The sunk basin is lined very prettily with rockwork and foliage, and illuminated with arc and incandescent lamps by Messrs. Laing, Wharton, and Down. The effect is not altogether bad, so far as it goes; but it would be greatly improved if the electric lighting firm were not so desperately anxious to make the best of the advertisement. As it is, the spectator is not allowed to admire the effect without being clamorously appealed to by placards which inform him wherever he looks that "the artistic illumination of this fountain is by Laing, Wharton, and Down." Now, it is all very well for the painter of a picture to sign his work, but how can we admire it if he persists in writing his name large across every part of the scene? Besides, there is nothing so very wonderful about this piece of lighting to anybody who remembers the South Kensington series of exhibitions. If the last word upon fountain lighting was not said then by the late Major Francis Bolton, it is certain that the jovial Major's shade, if permitted to revisit the "pale glimpses of the"—arc lights at Sydenham, will not discover anything here to envy.

Well, it may be objected by readers of these articles that we have said enough of a fault-finding character about the lighting exhibits, and that, unless it is our intention to damn the affair altogether, it is time we began to point out what there is praiseworthy in it. We certainly do not desire to condemn the show as utterly bad, for it contains much that is both instructive and pretty to look at. Having warned our readers against accepting implicitly reports that may be brought under their notice claiming that the present exhibition is better, prettier, and more successful than its predecessors; and having drawn attention to blemishes and shortcomings that not even electricians themselves can deny, although they are not likely to say much about them, we are free to admit that there is plenty of evidence in this exhibition to support the general conviction that incandescent electric lighting can be made very nice indeed for users who combine good taste with plenty of money, or, having the latter, know where to go for the former. Money is, of course, the first necessary—not so much, perhaps, with regard to the fittings as for securing good light, and plenty of it. If a really good light is desired, the lamps must not be spared. There is all the difference in the world between the aspect of an apartment wherein the lighting is disposed with a view to economy, and another where this is not studied. It practically amounts to this: Whether a user of incandescent electric lamps is or is not prepared to spend a great deal of money upon his pendants, &c., he must not stint his wiring or the number of points available for the attachment of lamps, or the general effect will be disappointing. Again, when he has his lamps, he must work them at their highest efficiency, regardless of occasional breakages, or the resultant light will be bad in colour, and will fail to "carry" well. The latter consideration will come out very prominently when use is made of these lamps for reading or working. Take, for instance, a nominal 16-candle power Edison-Swan lamp, rated at 105 volts. If this lamp is "nursed" by supplying it at 100 volts, or even less, as is frequently done, its durability is increased, but at a very obvious sacrifice of brilliancy. Provided there are plenty of lamps, a better effect can be depended upon than when there are but few; although in the latter case the fittings may be of a more ornate character. Indeed, there are many stalls at the Palace where as good an effect as can be desired is attained by the use of very simple fittings—the lamps hanging straight down by plain suspenders, and shaded by paper screens. But—and this is the great principle—there must be plenty of them; and they must be bright. What these conditions mean would sound like an exaggeration if we were to base the statement upon our unsupported opinion. It is a fact, however, that many show-rooms and stalls at the Palace measuring about 14 or 15 feet square—rooms, at any rate, no larger than an ordinary sitting-room in a small private house—are hung with 12, 15, or 18 incandescent lamps. There is one picture-room, measuring 11 feet by 18 feet, which has eight 50-candle lamps to light the walls; and pendants carrying a dozen lamps or more are by no means exceptional. With lighting upon this scale, gas, it may be admitted, cannot compete. Gas engineers would never dream of putting from one to two dozen burners into a lady's boudoir; and eight or nine lights in a bed-room would be regarded as an outrageous allowance. Yet, be it noted, these lavishly-lit rooms and stalls are not too bright. An instructive example of what gas could do, if used upon anything like the same scale, is to be seen at the well-known stall of Messrs. William Sugg and Co., which is a spot of brightness even where all is bright. Accusations have been laid against Messrs. Sugg of their going into the electric lighting trade; and one scientific gentleman inquired of the head of the firm, who happened to be standing by the stall, where he kept the dynamo which supplied a cluster of particularly brilliant "Cromartie" lamps in wavy glasses. It is hardly necessary to say that Mr. Sugg was equal to the occasion, and promptly introduced his inquisitive questioner to the gas-meter! If this story had not been true, it would be *ben trovato;* but it is, we believe, well founded.

Chemical Society.—At the meeting of this Society next Thursday, Professor Foster will bring before the members "Some Analyses and Lighting Values of English Coal Gas made during 1891," and a "Note on the Origin of Luminosity of Coal Gas Flames."

The Rotherham Gas Managership.—The appointment of Gas Engineer for which the Corporation of Rotherham invited applications in the JOURNAL a few weeks ago has been conferred on Mr. Newton, an assistant at the Sheffield Gas-Works. The duties include the management of the water-works.

Richmond and Co., Limited.—Owing to the great development of the business of this Company since its incorporation, and to the important extensions of buildings and plant consequent thereon, the Directors have decided to issue the remainder of the capital—viz., £10,000—in £10 shares. Of this amount, £5 will be payable on allotment; but no portion of the remainder will be called up till nof less than three months have elapsed

Increasing Use of Gas for Industrial Purposes.—In reference to the paragraph under this heading in the last number of the JOURNAL (p. 335), we learn from Messrs. Fletcher, Russell, and Co. that the eleven cases there referred to, entailing a gas consumption of 1300 cubic feet per hour for industrial purposes, were the result of *one week's* incidental calls, employing a part only of their customer's time; and the matter was mentioned as the result of a week's experiment in a line which he intended to develop into a regular business in addition to his existing work.

Presentation to Mr. J. Duxbury, of Darwen.—At the Darwen Theatre Royal Assembly Rooms last Friday night, the workmen employed at the Darwen Corporation Gas-Works, presented Mr. John Duxbury, who has accepted an appointment with the Windermere Gas and Water Company, with a marble timepiece, a gold Albert chain, several volumes of books, and a case of drawing instruments, as a token of their respect. Mr. T. Duxbury, the Manager of the Darwen Gas-Works, presided; and the presentation was made by Mr. W. Pickering, the oldest employee at the works.

NOTES.

Preservative Paints.

The subject of preservative paints for structural ironwork is of perennial interest for gas managers, who have for many years been habituated to the use of iron oxide and zinc oxide paints, on account alike of their protective and acid-resisting character. It now appears, from a communication of Mr. A. Sahlin to the American Institute of Mining Engineers, that the slags produced in iron puddling and re-heating furnaces are being introduced as "stock" for paint. The slag is ground to an impalpable powder, and mixed with oil in the ordinary way. Samples tested at the works at Boonton, New Jersey, show the material to have the following approximate composition: Iron oxides, 71 per cent.; manganese oxide (puddle slag), 6 per cent.; silicic acid, 16 to 20 per cent.; with a little lime, phosphorus, and alumina. Of sulphur, there is scarcely a trace. The cinder from the re-heating furnaces gives the best results; but both are said to make good paint stocks. When ground up with linseed oil, the material works up into a dark olive-green paint, so neutral in tint that a slight addition of positive colouring will make it bright blue, yellow, drab, or glossy black. The finest dust is used for the higher-class paints, for which purpose about 40 per cent. of the slag is available. The rest is collected in the settling chamber, ground to a fineness of about 225 mesh, and used for producing durable shades of dark red for railway and other purposes. Mr. Sahlin asserts that these slag paints are remarkable for their durability, body, gloss, and covering capacity, as well as for the stubbornness with which they resist all chemical reaction. They are also stated to be low in price, and of uniform fineness and composition. The raw material is available in great abundance, and at nominal cost. It would be interesting to hear whether or not slag-paint is likely to become a valuable bye-product of the British iron industry.

Lord Rayleigh on Heat-Engines.

Lord Rayleigh writes to *Nature* on the subject of the superheating of steam between boiler and engine, with a view to increasing the efficiency of the latter, and draws attention to what he calls a curious misapprehension, even on the part of high authorities, with regard to the application of Carnot's law to an engine in which the steam is so treated. This is the taking of the temperature of the superheater as the "superior temperature" for the computation of the efficiency of the plant under that law. Lord Rayleigh states that an estimate of the possible efficiency founded upon the temperature of the superheater must be immensely too favourable; and he suggests that the chief advantages which might attend the judicious use of a superheater "would be connected rather with the prevention of cylinder condensation than with an extension of the range of temperature." If it is wished effectively to raise the superior limit of temperatures in a vapour-engine, the boiler must be made hotter; and so the conditions operating in the case of a gas-engine will be copied. In a steam-engine this would mean pressures that would soon become excessive; and the only escape lies in the substitution for water of another and less volatile fluid. (This, it will be noticed, is going altogether contrary to the recent attempts to improve the efficiency of a steam-engine by introducing ammonia into the boiler.) In the absence of convenient liquids other than water, Lord Rayleigh recommends the restraining of the volatility of water by the addition of saline matters, such as chloride of calcium or acetate of soda. In this way the boiling temperature may be raised without encountering excessive pressures. This method would involve the condensation of steam at higher temperatures than with pure water; and it points to a new principle of compounding.

Breeze Concrete.

Further correspondence upon the subject of breeze concrete for flooring, &c., has appeared in the *Builder*. Mr. T. Potter, of Alresford, writes to say that in his opinion breeze from gas-works is very far from being the best material for concrete floors, especially of large span; its utility being confined chiefly to short spans, with a free use of iron or steel girders. Breeze is improved, so far as strength goes, by washing; but even then it is too sandy and deficient in strength to make good concrete. Mr. Potter declares that it requires a greater proportion of cement than many other aggregates to produce, in comparison, concrete capable of withstanding moderate tensile and compression strains. The same correspondent goes so far as to state that breeze does not make a good aggregate for walling; and assuming that it was obtainable for nothing, he asserts that, if measured by strength, it would prove to be the most costly material in use for this purpose. With regard to the nailing of flooring boards directly upon concrete Mr. Potter supports the practice. He recommends the forming of the mass of concrete at the earliest opportunity, finishing off with a layer 1½ or 2 inches thick of breeze (or sifted brick rubbish, when the former is unattainable), which is to be carefully levelled. This should have at least a month to dry, being left as bare as possible to the wind; and after the longest practicable delay, the boards may be nailed down. The advantage of nailing boards directly upon the concrete, besides that of leaving no intervening space for mice and other house pests, is that much thinner flooring is required.

COMMUNICATED ARTICLE.

LIGHTING.

By W. H. Y. Webber.

(*Continued from p.* 293.)

PART IV.—THE PHOTOMETRY OF LIGHTING.

The actual photometry of illumination is a subject to which a few words of discussion may be given at the close of what has been advanced in these articles upon the general subject. It is a matter, as Mr. W. H. Preece has observed, which is full of difficulty. His own attempt to construct a diffusion photometer was a failure, for reasons which need not be further examined; and in what will now be said upon the subject, the aim of the writer will be rather to suggest the lines upon which practical experiments in this regard may be imagined to be most hopeful, than to recommend any particular instrument. The importance of the actual measurement of lighting is due to the fact that calculated values of lighting from the known or the estimated light-giving power of a light-source can never be more than approximations to the truth. If we know the illuminating capacity of any lamp, from tests conducted in the dark room, and calculate therefrom the lighting effect which such a lamp ought to produce at a definite distance, upon an object bearing a certain angular relation to it, the result may be vitiated by three sets of influences for which neither dark-room photometry nor the laws of optics enables us to find absolutely correct arithmetical expressions. These are: (1) aberrations of radiation of the lamp when compared with theoretical spherical radiation; (2) the reflection from walls, ceilings, &c.; (3) absorption of the light in its passage through the air. To these influences might be added a fourth—the disturbing effect of peculiarities of structure of the lamp or the lantern, presence and disposition of reflectors, state of the glass, and so forth.

Thus calculation can at best only tell us what ought to be the illuminating effect, under certain conditions, of a given light-source; but it cannot inform us how far our expectations are realized in any particular case. The practical efficiency of an example of artificial lighting, as compared with its theoretical value, is, in short, to seek, after calculation has done its best for the lighting engineer. This consideration does not in the least detract from the value of such calculations. Far from it; because the calculation is needed at the most important stage of the progress of a lighting experiment—*i.e.*, before the light is shown at all. This is when the engineer is called in. Afterwards, photometry will only clinch the experience, as it were, by helping to define the causes of success or failure for future guidance. Both kinds of information are needed for exhaustively dealing with a problem of the kind under discussion; just as in steam engineering, where, although the engineer must be able to specify the dimensions of the boiler he needs for any particular plant, he still finds a working test useful to teach him how far his expectations have been realized.

In the photometry of lighting, even more than in the photometry of lights, the difficulty of arriving at exact results arises in the first place in regard to the standard, and secondly in respect of the instrument. In regard to the standard, there is practically no choice. We must take the British standard candle. In France, the carcel is the legal standard; but it has so little superiority to the candle that, as we have already seen, a leading French authority in physical manipulations—M. Mascart—prefers to express his result in terms of the candle, even though he employs a lamp of ten times the illuminating power for his actual determinations. It would only labour the subject were we to enumerate all the objections expressed by photometrists with regard to the use of the actual candle in the measurement of light. For the present purpose, even if we take the parliamentary standard candle as less black than it has often been painted, it has one great drawback—the colour of its light, which is so much redder than that of gas-burners of any but the dullest kind, to say nothing about the electric arc light, as to gravely embarrass the observer who attempts to establish uniformity of illumination as between light-sources of such divergent characters.

The candle is quite powerful enough as a unit for measuring diffused light; but it is not intrinsically bright enough. What is wanted is either a small light-source emitting rays of the same character as those with which they are to be balanced, or, failing this, some means of neutralizing the discrepancy. It seems hopeless to look for the former requisite, seeing that, notwithstanding the efforts that have been made by the ingenious of the whole civilized would to attain this end, the various proposed substitutes for the standard candle have had but partial success. The most convenient and portable of these is doubtless the Hefner-Alteneck amyl-acelate lamp. But this has the great drawback that its light is even redder than that of the standard candle. No standard which is a fixture, like the Methven slot, is available for the photometry of diffused lighting, which presupposes that measurements may be made anywhere, indoors or out. It is open to suggestion, however, whether approximate determinations of the legibility of printed characters could not be made, by a sufficiently painstaking individual observer, by the light of a fixed standard in a dark room, which would serve the same observer as bases of comparison under different conditions of lighting. It is evident that such determinations would be

useless for different observers, on account of the divergency of individual visual acuity. M. Le Chatelier and others have constructed instruments to measure such acuity; but this principle has never been accepted as constituting a reliable basis of light measurement. Individually, however, as already remarked, some use might be made of the principle, if the determinations were carefully carried out. The test cards would need to be chosen from the same parcel, of course, to avoid difference of tint; and the printed characters would need to be arranged to form nonsense words, in order to eliminate scanning. The pentane standard bids fair to be adopted, for lack of a better, as the scientific expression of the light of a candle for Great Britain. Its light is whiter than that of its prototype, but still leaves something to be desired in this respect. Although the pentane standard is made in a portable form, it is doubtful whether this arrangement is really convenient enough to recommend it for use in a photometer for diffused light.

If a small incandescent electric lamp, working very near the limit of the endurance of the filament, could be standardized and maintained by a battery in a steady "gait" for (say) 100 hours, it would answer the purpose admirably. Such a lamp might be used in a manner different from that suggested by Mr. W. H. Preece, in which the illuminating power of the lamp was required to be varied. It would be better to treat it like any other standard, by simply moving its position with reference to the photometrical screen. The present reputation of incandescent electric lamps is hardly good enough, however, to warrant our looking in this direction for the wished-for practical unit of lighting.

There is nothing for it, therefore, but to fall back upon the candle itself. It is, to say the least of it, much handier than the lamp employed by M. Mascart and his fellow-workers in this field, and is not far from being as reliable. If the observer working with the candle is constrained to exercise some mental reserve with regard to the exactitude of his results, he can console himself with the reflection that, in the measurement of diffused lighting, the probable errors of observation, due to the inherent difficulties of this work, will be likely to outweigh the imperfections of the standard.

In the measurement of diffused light, the object is the same as in all photometry—to equalize upon a screen the effects of two lights of known and unknown powers. Mascart's apparatus (see Vol. LVIII., p. 798) may be cited, not merely as a practicable instrument in itself, but also as exemplifying one way of dealing with the problem. The instrument is not really so complicated as it looks, with its mirrors and Foucault screens; but, to judge it from sight, it has the disadvantage of being workable only in strong light. No feeble rays are those which are to survive filtration through a Foucault lens of thick paper and double reflection from mirrors at an angle of 45 degrees. Such an instrument, with its standard lamp of 10-candle power, would doubtless answer sufficiently well in a brilliantly-lighted saloon like the auditorium or the *foyer* of the Paris Opera; but it would not be delicate enough to deal with street lighting, when there are commonly some very obscure spots and corners to be explored by an instrument of the kind. A photometer which could not be made available, for instance, to interpret in figures the degree of spottiness of the light afforded from electric arc lamps in a thoroughfare as to the lighting of which the local authorities, although on "brilliancy bent," yet preserve a "frugal mind," cannot be recommended for general adoption.

In these circumstances, we shall best escape from the difficulty of selecting a perfect instrument by dispensing with all instrumental aid. There is much in what was once said about the troublesome and unnecessary complication of photometrical apparatus by Sir W. Thomson, while engaged in comparing the values of two lights by the aid of a sheet of paper, a lead pencil, and a tape measure. For diffused light, in point of fact, sufficiently accurate measurements may very often be made by similar means. Indeed, it is only necessary to seek for photometrical apparatus of any kind in lighting determinations, when the method of shadow comparison has been tried in vain. The shadow method requires absolutely nothing more than a candle, a lead pencil to throw shadows, a piece of paper to receive the shadows of the pencil by the different lights, a 2-foot rule for measuring the distance of the candle, and a tape for performing the same office by the unknown light. A simple description of stand, which will relieve the observer of a good deal of adjusting his candle, &c., by hand, is shown in the accompanying diagram.

Here a horizontal table T is clamped upon a tripod F, such as is used for supporting photographic cameras, and can be purchased for a few shillings. Fixed to an arm is the lead pencil R, which extends horizontally above the top of the table T at a distance of 1½ or 2 inches. Its shadow is thrown on the table by the light-source S, and also by the candle C, which is carried in a balanced holder capable of being set firmly by a thumb-screw at any point upon the graduated rod M. This rod is produced to P and counterbalanced; so that, being pivoted on the side of the table T, it can be fixed at any angle corresponding to that of the rays of light from S. When the shadows of R are equidistant from the centre of the table, the angular incidence of the two lights is equal, and this angle may be read off from the quadrant Q, which is graduated for the purpose. It is evident that this arrangement will not measure light falling vertically through the plane of R; but even this might be managed by the aid of a couple of mirrors at an angle of 45 degrees. Although the table is at some distance above the floor or the ground, it will receive practically the same effects of irregular reflection as it would if lowered to the ground; and consequently, when desired to give the lighting effect upon the ground, the height of the table may be allowed for without further correction. The difficulty caused by the colour of the candle-light may be minimized, if necessary, by using paper tinted a pale yellowish brown, for receiving the shadows of the pencil; but it cannot be wholly overcome.

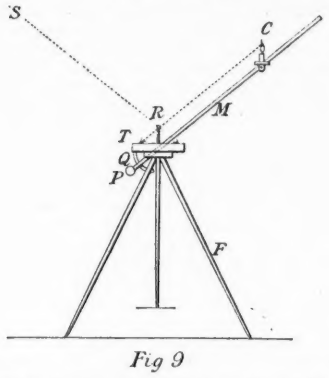


Fig 9

Students will find a great advantage in making their own apparatus for physical experiments, since in this way they become imbued with the principles underlying all such apparatus, which are apt to be hidden from sight by the varnish and polish of the instrument maker. There is room, however, for a good deal of ingenious contriving in regard to the provision of instrumental aids to the exact measurement of lighting; and this series of articles will have more than fulfilled the writer's object if they help forward the scientific study of the subject by exhibiting the deficiency of present knowledge in regard to it.

(To be continued.)

TECHNICAL RECORD.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Twenty-second Annual Meeting of this Institution was held last Saturday, at the Grand Hotel, Manchester.

At the time for commencing the proceedings,

The SECRETARY (Mr. S. S. Mellor, of Northwich) stated that he had received a letter from the President (Mr. T. O. Paterson, of Birkenhead), to the effect that he had met with an accident to his foot, and could not possibly be present that day. In Mr. Paterson's absence, he had to propose that Mr. W. W. Hutchinson, of Barnsley, be Chairman *pro tem.*

Mr. G. SMEDLEY (Buxton) seconded the motion, which was carried unanimously.

The CHAIRMAN said he regretted very much that the President was not with them, especially because this was the last occasion in his official year on which he would have the opportunity of presiding. They trusted Mr. Paterson would soon recover from the effects of the accident.

MINUTES OF LAST MEETING.

The SECRETARY then read the minutes of the last meeting, held at the Grand Hotel, Manchester, on Saturday, Nov. 21.

On the motion of Mr. C. ARMITAGE (Lancaster), seconded by Mr. W. DUFF (Morecambe), the minutes were adopted.

LETTERS OF APOLOGY.

Several letters of apology were received, amongst the writers being Mr. W. A. Valon, the President of the Incorporated Gas Institute; Mr. Isaac Carr, of Widnes; Mr. J. R. Smith, of Padiham; Mr. J. Laycock, of Keighley; Mr. J. Crawshaw, of Tyldesley; Mr. T. Thomas, of Knutsford; Mr. W. C. Waddington, of Manchester; Mr. H. H. Ford, of Macclesfield; Mr. E. A. Loam, of Stalybridge; Mr. J. Timmins, of Wigan; Mr. J. C. Ingham, of Ramsbottom; and Mr. J. Hepworth, of Carlisle.

NEW MEMBER.

Mr. Henry Simmonds, of Colne, was nominated as a member by the President; and his election was unanimously agreed to, on the motion of the SECRETARY, seconded by Mr. W. R. CHESTER (Nottingham).

THE ANNUAL REPORT.

The SECRETARY read the report of the Committee and the statement of accounts. The former was as follows:—

The Committee in presenting the twenty-second annual report are glad to be able to congratulate the members on the continued usefulness of the Institution. There have been nine new members elected during the year. It is with deep regret that the Committee have to report that five members have been removed by death during the year—viz., Mr. S. Barratt (Manchester), Mr. A. Crawshaw (Tyldesley), Mr. N. Meiklejohn (Longwood), Mr. B. Midgeley (Milnebridge), and Mr. T. Moore (Macclesfield). One ceases membership under Rule 1; and two have resigned. The total number of members is 87.

The twenty-first annual meeting was held at the Grand Hotel, Manchester, on Saturday, Feb. 28, 1891. There was a large attendance, including many old members. The President delivered a very useful and instructive

Inaugural Address. The adjourned discussion of Mr. Newbigging's paper entitled "Lime Burning" was then taken, which proved interesting. On this occasion (the 21st birthday of the Institution) the members dined together at the close of the meeting.

The May meeting took the form of an excursion to Beeston Castle, which was very interesting and enjoyable, although there was only a moderate attendance. This no doubt was due to the large amount of sickness prevalent among the members at the time, and to the wretched weather experienced previous to the date of the meeting.

On the invitation of the President, the August meeting was held at Birkenhead; and it included a visit to Messrs. Lairds' works, the gas-works, and to the Ship Canal works at Eastham. The Gas and Water Committee invited the members to a sumptuous luncheon at the Town Hall (Mr. Bloor, Chairman of the Committee, presiding), and over 100 gentlemen were present. A number of toasts were proposed and responded to—including those of the "Birkenhead Corporation," "The Gas and Water Committee," and the "Manchester District Institution of Gas Engineers." At the close of the luncheon, a room was kindly placed at the disposal of the Institution by the Finance Committee, in which to hold the business portion of the meeting. The President, on taking the chair, gave a cordial welcome to the members. Mr. Newbigging contributed a paper entitled "Differential Rates." At the close of the meeting, the Ferry Committee of the Corporation kindly granted the use of the steamer *Claughton* to convey the members to Eastham and back to Liverpool. The attendance was one of the largest on record. The thanks of all who were present are due to the various Committees of the Birkenhead Corporation, and to the President, for the handsome and generous manner in which they entertained the Institution.

The November meeting was held at the Grand Hotel, Manchester. There was only a moderate attendance. Mr. Charles Armitage (Lancaster) was unanimously elected President for the ensuing year. A discussion then took place on Mr. Newbigging's paper entitled "Differential Rates." Mr. John West contributed a practical and useful paper, entitled "Stoking Machinery, &c.," which caused a good discussion. Mr. Valon, President of the Incorporated Gas Institute, was present. Owing to a misunderstanding, a paper promised by one of the members was not forthcoming; and at very short notice Mr. Newbigging kindly consented to give a paper entitled "Management." Owing to want of time, it was adjourned to the annual meeting.

The Committee have during the year had under their consideration a communication from the Secretary of the Royal Labour Commission, inviting evidence on behalf of the Institution. After full and careful consideration, they decided not to appoint a witness. Mr. Valon, President of the Incorporated Gas Institute, has been appointed by that body to give evidence on their behalf, and has intimated his intention of consulting with the Presidents of the various District Associations before doing so.

In presenting the statement of accounts, the Committee regret that there is a small balance against the Institution; but this would have been discharged had the members who are in arrear paid their subscriptions before the books were closed.

The retiring members of the Committee are Messrs. Timmins and Cockcroft. Mr. Cockcroft is eligible for re-election.

T. O. PATERSON, President.
SAML. S. MELLOR, Hon. Sec.

In explanation of the extra expenditure and the deficit in the accounts, the Secretary said there had been a heavier expenditure on printing and stationery, and the expense of the meetings had been greater—the cost of the May meeting being especially enhanced by the small attendance.

The CHAIRMAN proposed the adoption of the report and accounts. He said he was sorry that so many of the members had died during the year. They had, however, had a larger number of new members; and at present they had one more than twelve months ago, which might be regarded as satisfactory.

Mr. ARMITAGE seconded the motion, which was carried.

ELECTION OF OFFICERS.

Mr. C. E. JONES (Chesterfield) proposed the election of Mr. W. R. Chester, of Nottingham, as Senior Vice-President for the ensuing year. His qualifications, scientific and otherwise, were well known. He would make a most excellent Vice-President; and an equally excellent President when the time came for his advancement to the chair. He (Mr. Jones) trusted that during Mr. Chester's term of office as President, the Institution would honour the town of Nottingham by a visit.

Mr. R. MERRELL (Mossley) seconded the proposition.

The CHAIRMAN, in putting the motion, said Mr. Chester had been a most attentive member of the Committee, and had been present at their meetings very regularly, notwithstanding that he had to travel long distances to the place of meeting.

The resolution was unanimously passed.

Mr. HARRISON VEEVERS (Dukinfield) moved the election of Mr. J. Braddock, of Radcliffe, as Junior Vice-President; and, in doing so, said there was no more frequent attendant at their meetings than Mr. Braddock. He had, moreover, served the Institution as Secretary—a circumstance which fully entitled him to the higher posts of Vice-President and President.

Mr. SHIRES (Kidsgrove) seconded the resolution; and it was adopted.

Mr. BRADDOCK briefly acknowledged the kindness shown him by his selection as Vice-President. Nothing, he said, would be wanting on his part to justify their selection.

Mr. W. S. HADDOCK (Warrington) moved, and Mr. W. SMITH (Hyde) seconded, the re-election of Mr. Thomas Newbigging, of Manchester, as Treasurer; and the proposition was adopted.

The CHAIRMAN moved the re-election of Mr. Mellor as Secretary. He said he had served the Institution well during the whole period of his tenure of office, and had worked hard to secure the success of the meetings.

Mr. W. FOSTER (Nelson) seconded the proposition.

Mr. T. DUXBURY (Darwen), in support of the motion, referred to the indefatigable labours of the Secretary, and said he would not wish for a better man for the position than Mr. Mellor. Members of the Institution who had passed the chair, and knew the work which the Secretary got through, were perhaps most fitted to judge of its worth; and, speaking as one of those, he (Mr. Duxbury) could say that Mr. Mellor was a most excellent Secretary, and he feared that, if they changed, it might be for the worse.

The resolution was carried.

Mr. MELLOR said he was much obliged to the members for re-electing him. There was certainly a lot of work to do in connection with the post; but one met with a good deal of kindness at the hands of the members, which stimulated one to do the work well.

Mr. DUFF proposed the election of Mr. J. Parkinson, of Brighouse, as a member of the Committee, and said he would do good work in the years to come.

Mr. E. LORD (Whitworth) seconded the proposition, which was passed.

Mr. W. SEVERS (Lymm) moved the election of Mr. R. Bridge, of Doncaster, as another member of the Committee.

Mr. H. VEEVERS seconded the motion, which was carried.

Mr. DUXBURY (Darwen) proposed, and Mr. C. E. JONES seconded, the reappointment of Mr. W. Smith, of Hyde, and Mr. J. Mackenzie, of Wilmslow, as Auditors; and this was agreed to.

THE NEW AND THE OLD PRESIDENTS.

The CHAIRMAN remarked that the next business was the introduction of the President for the ensuing year; and, in the absence of the retiring President, he had great pleasure in discharging that duty. Mr. Armitage would, he was sure, do honour to the Institution, and would fill the chair most admirably. As an Institution, they had visited Lancaster, and received at the hands of the Corporation kindness which showed that, in his own town, the President was respected and well supported.

Mr. ARMITAGE who was received with applause then took the chair.

Mr. T. B. BALL (Rochdale) proposed that the thanks of the Institution be given to the retiring President for his conduct in the chair, and his attention to the interests of the Institution during the past year. Mr. Paterson had performed his duties in an admirable manner. The Institution had maintained its prestige under his guidance; and he was sure they all regretted that he was not present to receive their thanks in person.

Mr. J. CHADWICK (Oldham) seconded the motion, which was adopted by acclamation.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Gentlemen,—I thank you sincerely and most heartily for the honour that you have conferred upon me in electing me to the presidential chair. At the outset, I have to confess that I have not merited the position. It is true that I have been a member for a number of years; but I have not taken such an active part in your deliberations in the past as would warrant you in placing me in such a distinguished position. But my apparent apathy has not retarded the work of the Institution. Many important matters have been investigated and discussed by the Institution, much to the advantage of its members and of the community generally. I am also cognizant of the fact that the presidential chair has been occupied by some of the ablest men of our profession, which makes the duty more difficult for me. However, I trust that I may have the assistance not only of the Committee, but of the whole of the members, in order that I may successfully discharge the functions of the chair, so that the work done during my year of office may at least be equal to, if not an advance upon, that of my predecessors.

There are many important subjects that require to be investigated. I would suggest one—viz., that which is usually termed "condensation." This subject is of vital importance, and is not at all well understood. I think I am right in saying that, notwithstanding its importance, it has received the least attention of any subject connected with gas manufacture. The quality of gas greatly depends upon the mode of condensing. Therefore I would suggest that this Institution should form a Committee to consider the question and conduct experiments; and I shall be pleased to give any assistance in my power. I am aware that it is difficult for gas managers to devote any lengthened period of time to research and investigation; their other duties, which are multifarious, demand practically the whole of their attention. The Council of the Incorporated Gas Institute have decided to make an appeal to owners of gas undertakings for donations or subscriptions to enable them to prosecute inquiries into technical subjects. I feel sure that the members of this Institution will join with me in wishing that the appeal may be heartily responded to. There are many difficult scientific problems in connection with gas manufacture which require to be investigated to ascertain their nature; and this investigation should be made by a properly authorized and qualified Committee.

Great progress has been made in the manufacture, purification, and distribution of coal gas since its first introduction by Mr. William Murdoch 100 years ago. In referring to the introduction of gas lighting, I may briefly mention that history says that in 1739 Dr. Clayton distilled Newcastle coal, and obtained as products an aqueous fluid, a black oil, and an inflammable gas, which he caught in bladders, and by pricking these he was enabled to

burn the gas at pleasure. It is further known that, in the beginning of the last century, Dr. Stephen Hales submitted pit coal to chemical examination, and found that, during ignition in closed vessels, nearly one-third of the coal became volatilized and assumed the form of inflammable vapour. In the year 1767, the Bishop of Llandaff made some experiments with the vapour and gaseous products evolved during the distillation of pit coal, and found that the volatile products remained inflammable after passing through water and ascending through high curved tubes. The other products obtained by this venerable prelate were aqueous ammoniacal fluid, a tenacious oil resembling tar and ammoniacal liquor, and spongy coal or coke. But the first discovery and application of coal gas for the purpose of illumination is claimed for Murdoch, who, in 1792, when residing at Redruth, in Cornwall, commenced a series of experiments upon the quantity and quality of the gases obtained by distilling coal, peat, wood, and other inflammable substances. In 1798 he constructed an apparatus for the manufacture of coal gas at the Soho Foundry, Birmingham. Soon afterwards, Mr. Samuel Clegg, of Manchester, a pupil of Murdoch's, communicated an account of his method of lighting up factories with gas to the Society of Arts, for which he received the silver medal. This gentleman became the first Engineer to The Gaslight and Coke Company; and he erected the first public gas-works in London in 1813. Gas-works were first erected in Paris in 1815; in the United States of America, in 1821; and in Berlin, in 1826.

Rapid strides in gas manufacture have been made up to the present day. Coal gas is now a necessity, not only for lighting purposes, but for cooking, heating, and motive power; and the demand continues to increase. The receipts for gas in the United Kingdom are about 15 millions sterling per annum. I may here mention that it has recently been computed that the consumption of coal gas per head of population in Germany is 350 cubic feet; in France, 560 cubic feet; in England, 2450 cubic feet; and in London, 5000 cubic feet; and that upwards of 10 million tons of coal are carbonized annually in the United Kingdom for the manufacture of coal gas. This quantity of coal is about 6 per cent. of the total quantity raised in the United Kingdom; and the capital employed in gas-works is upwards of £106,000,000 sterling.

No fundamental or material alteration has been made in the destructive distillation of coal for at least half a century. The principle is practically the same; but many improvements have been made for carrying on the process. The pole star of the retort-house is to produce the greatest quantity of gas from a ton of coal at the least possible cost for wear and tear, fuel and labour, due regard being paid to maintain the quality of gas at the prescribed standard. It is unnecessary that I should dwell much upon this subject, which has been threshed out during the last few years. Suffice it to say that I am greatly in favour of gaseous firing, which has proved its great superiority to the old system, not only in the saving of fuel and labour, but in the increased production per ton. Generator furnaces will, in my opinion, ultimately be universally adopted. The subject which is now being most considered in the retort-house is the saving of labour by the adoption of inclined retorts and mechanical appliances. I am not in a position to express an opinion, *pro* or *con*, upon the advantages claimed for the inclined retorts, not having had any experience with them; but I am patiently waiting, as, no doubt, others are, the result of trials now being made. During the last few years mechanical appliances for charging and drawing retorts have been developed, and have shown great superiority to the old system of hand labour. It has been repeatedly stated that the steam stoker not only does its work much better, but that there is a saving of 1s. per ton of coal carbonized. Now, I submit that these are two very important considerations, apart from the more humane manner in which the work is accomplished. The old system of hand labour, in my opinion, wherever possible, should be abolished. There is no part of a gas-works plant that I should take a greater delight in seeing perfected than the steam stoker.

Many attempts have been made to produce illuminating gas from other substances than coal; but I am not aware that they have proved a financial success. The most feasible substitute, or (say) supplement, in my opinion, is carburetted water gas. It has often occurred to my mind that a gas-works is a very suitable place for the manufacture of water gas; the principal materials required being coke and steam. Coke is produced there in great quantities as a bye-product, and is very often in winter a perfect drug in the works, in consequence of the supply being greater than the demand at that period of the year. Now if a portion were used for carburetting water gas, we should not only have a diminished quantity of coke, but the market would be relieved; and I feel certain this would be of great monetary advantage. It has also struck me forcibly that it is quite feasible to carburet water gas by volatilizing coal tar, and that it is also within the range of possibility to use the tar direct without being first distilled. These are only crude suggestions; but I submit that they are worthy of consideration, as by this means gas manufacturers will become users, to a certain extent, of the bye-products of carbonization. Another advantage would be that a large quantity of this gas could be produced at a short notice. I have just learned that a process to manufacture hydrogen gas has been patented; and if this hydrogen can be carburetted, as the patentee says it can, it may afford facilities to large gas-works to meet any sudden and severe demand for gas. I may mention that the primary intention of the patentee was to get hydrogen for metallurgical purposes; but it may also be employed to aid us in periods of severe strain. Great difficulty is often experienced in giving an adequate supply of gas in foggy weather, especially in large towns, which necessarily creates a great amount of anxiety to those entrusted with the supply of artificial light. I may mention that I have decided to make some experiments in the direction of carburetting water gas; and, if successful, I shall be pleased to report progress on some future occasion.

In the ordinary process of carbonizing coal, "which is composed of variable quantities of its constituent elements," about 32 per cent. is volatilized, and many complex compounds are obtained. Fifty-three per cent. of this remains in a gaseous form, and is delivered to the public; about 5 per cent. constitutes the impurities; and the remainder, say, 42 per cent., is tar and ammoniacal liquor. The most valuable of these is the gaseous portion. Therefore it is necessary that the greatest attention should be given to this commodity, not only in the process of distillation, but in its after-treatment, in order that it may not suffer deterioration in quantity or quality. I remember an old saying, that good condensation is half purification. This is an error. Some little advantage may be gained in the way of purification; but the gain is far outweighed by the loss in illuminating power. Whenever excessive condensation is carried out, it reduces the quality. I maintain that more care should be devoted to this part of the plant, as on it the quality of the gas produced greatly depends.

Many forms of condensers have from time to time been constructed. The main object in construction generally has been to produce an apparatus to condense or cool the gas to the temperature of the air; and in many instances this is done at the expense of the luminous constituents of the gas. I will not trouble you by giving a description of the various forms of condensers which have been adopted, or of those which are now mainly in use at the present day, but will content myself by saying that all condensers should be avoided that prevent a free flow. The gas should not be allowed to strike against surfaces that are covered with tar, or assuredly many suspended particles, that otherwise would remain gaseous, will be precipitated. Various members of the benzene series are carried down in this way; and the quality of the gas is thereby impoverished. Formerly it was said that much benefit accrued from allowing the gas and tar to travel together in a foul main around the retort-house. This, too, has been proved to be fallacious; on the contrary, serious loss in illuminating power is the result. The tar is now usually taken from the end of the hydraulic main and the gas from the top, and is conducted through a foul main to the condenser; but frequently the foul main is allowed to fall the wrong way—*i.e.*, towards the outlet. This should be reversed, in order that the precipitated tar should return to the hydraulic main, where the greatest heat prevails, so that some portion of the precipitate may be again volatilized, and, in all probability, be eventually carried forward to the gasholder. It was also claimed that, if the gas and tar were allowed to travel together, the tar would absorb the naphthalene, and so prevent any deposit of that substance in the mains, and other parts of the plant. But I maintain that naphthalene is not to be regarded as an enemy; and that it should be retained. Coal gas contains only about 5 per cent. of illuminating matter, and naphthalene is one of the best of these. Therefore, we cannot afford to lose what appears to be a bad servant simply because we are unable to understand its qualifications. This subject has been brought to my mind quite recently through perusing a paper read by a brother engineer to a kindred Association, in which he sought to show that, by carburetting with oil, a 16-candle gas may be supplied without having recourse to cannel. In my opinion, there should be no difficulty in producing this quality of gas from ordinary gas coal, if the cooling, or condensing, is more scientifically carried on. Therefore I submit that our energy should be devoted to the matter of condensation rather than to any attempt to make up a deficiency of the quality by carburetting.

My thoughts have been turned in this direction, probably, mainly in consequence of my acquaintance with the process of the distillation of coal tar. I was led some time ago to make certain experiments in order to determine how I could best take advantage of the luminous constituents in coal. My thoughts naturally turned to analyzing tar taken from different parts of the plant. When this was accomplished, I ascertained where the light-giving properties were precipitated; and, after some consideration, I came to the conclusion that it was quite possible to precipitate the heavy hydrocarbons, and to keep the light ones in suspension. The simple process of fractional distillation of coal tar suggested this mode of arriving at a conclusion. The experiments taught me that it is as possible to keep the light hydrocarbons gaseous, and precipitate the heavy hydrocarbons in the condensation of gas, as it is to separate the light hydrocarbons from the heavy hydrocarbons in the process of fractional distillation. To accomplish this much-desired result, it is necessary to maintain the temperature of the gas after it leaves the hydraulic main, or even to increase its temperature for a lengthened period. By this means the heavy hydrocarbons will be precipitated, and the

light hydrocarbons kept suspended. Foul mains around the interior of the retort-house are favourable to this process; but these should be of large capacity to allow the gas to travel as slowly as possible. Wrought-iron mains should be avoided, unless they are covered with a composition of non-conducting material to retain the heat.

Some time ago I had occasion to make extensions in the retort-house of the Lancaster Corporation Gas-Works; and, having these convictions in my mind, I resolved to put them to the test. I accordingly erected a cast-iron foul main, 550 feet in length, 18 inches in diameter, with a fall to the hydraulic. I inserted in this main a 2-inch steam-pipe, which I suspended in the centre throughout its entire length. At the outlet I fixed a steam-trap, and conducted the condensed water into a water-tank. By this means I was enabled to keep up the temperature of the gas throughout the full length of the main. Unfortunately, I am not in a position to give precise data as to the merits of the process; suffice it to say that the quality of the gas was materially improved. Had I made some tests previous to the alteration, I could have supplied you with the information. Being a tar distiller, I had an opportunity of comparing the quality of tar obtained under both circumstances. Previous to the alteration, the tar yielded about 9 gallons of crude naphtha per ton, distilling 30 per cent. at 120° C., in addition to which a quantity of naphthalene was always deposited in the creosote tanks. Subsequent to the alteration, I have only obtained about half the quantity of naphtha of the quality named, and practically very little naphthalene—in fact, so little that it was readily dissolved in the heavy creosote, and sold as creosote oil. These facts therefore illustrate beyond doubt that a great portion of the benzene and naphthalene series are maintained in a gaseous state. Benzol is capable of carrying a large quantity of naphthalene in suspension; and I have no doubt whatever that naphthalene contributes to the increased illuminating power more than the benzol. Professor Foster, in his valuable paper read at the meeting of the Incorporated Gas Institute last year, states that 5 lbs. of naphthalene will double the luminosity of 1000 cubic feet of 14-candle gas. This was illustrated by Mr. Leicester Greville some years ago, who also demonstrated that 103·8 grains of naphthalene, added to 3·3 cubic feet of gas, increased the lighting power from 9·9 candles to 24·7 candles. This quantity is equal to 4½ lbs. of naphthalene to 1000 cubic feet of gas, which would increase the luminosity 14·8 candles. Consequently, I am justified in saying that our energy should be devoted to increase the luminosity with the material at our command rather than to seek a foreign substance to make up for our apparent unscientific manner in treating the gas. I may mention that the gas at the Lancaster Gas-Works passes through an ordinary annular condenser after leaving the foul main. I am not much in favour of such condensers, and question very much whether I shall ever erect one of this type again. I should much prefer to pass the gas through large chambers at a slow rate. If the inner column were taken out of annular condensers, in my opinion much better results would be got. However, I may possibly have something further to say on this subject on a future date. Perhaps it would also be interesting to know that in Lancaster I have never seen a particle of naphthalene in the gas-works plant or in the mains and services; neither have I found any deposit of oil in the street syphons. This is a very important subject, and worthy of thorough investigation.

There is practically now no difficulty in eliminating the impurities from coal gas. When gas was first introduced, caustic lime was the only purifying material employed. Since then other methods have been adopted—viz., oxide of iron, Brin's oxygen process, admission of atmospheric air, and the Claus system. When the ammonia has been removed, caustic lime will remove the remaining impurities—*i.e.*, carbonic acid, sulphuretted hydrogen, and other sulphur compounds; but there are objections to using lime exclusively, in consequence of the nuisance arising from the removal of the spent lime, and the extra cost entailed. Lime is now used only to arrest carbonic acid and sulphur compounds other than sulphuretted hydrogen. Oxide of iron is employed for the elimination of sulphuretted hydrogen. The quantity of natural hydrated oxide of iron raised in Ireland during last year was 14,512 tons. The whole of this was used for the purification of coal gas, in addition to a large quantity of artificial oxide that is annually prepared from sulphate of iron. With the adoption of Brin's oxygen process, lime can be used exclusively. Sulphuretted hydrogen is decomposed by passing through hydrate of lime and calcic sulphide formed. This, in turn, is acted upon by the oxygen, and the sulphur precipitated in a free state, thereby rendering the lime again active, until eventually it becomes carbonated by the carbonic acid, save a small portion of the calcic sulphide, which is converted, in consequence of the presence of oxygen, into a higher sulphide, which combines direct with the remaining sulphur compounds, and forms what is usually termed a double salt. This can be decomposed if excess of carbonic acid is allowed to enter the purifier. We are indebted to Mr. Valon, the President of the Incorporated Gas Institute, for the experiments that he has made with this process. The atmospheric air process has now been known for some considerable time, and answers the purpose admirably; but it entails loss in illuminating power.

Some time ago the writer patented the application of oxygen obtained by the electrolysis of water; but, unfortunately, the system did not prove a financial success, in consequence of the large amount of motive power required to decompose water into its constituent elements. I made some experiments with a dynamo and a 2-horse power gas-engine; but the results obtained did not warrant me in continuing the process. I was unable accurately to estimate the quantity decomposed per horse power per hour, in consequence of the loss of water by evaporation as steam; but from information that I have been able to gather, I find that motive power from 1 ton of coal would be required to decompose 20 gallons of water. This would furnish 1992 cubic feet of oxygen, which would purify 398,400 cubic feet of gas, providing the gas did not contain more than 624 grains of sulphur per 100 cubic feet.

Purification in closed vessels appears the ideal of the future. This has already been accomplished by the Claus ammonia gas purifying process. The object aimed at in carrying out this process is to utilize one impurity—an alkali—to arrest the acid impurities. The process is rather complicated, but effective. It does not, however, assist the gas. It would be difficult to give a full description of the Claus system without inflicting upon you a very lengthy address. I may, however, just briefly state that the process is continuous, and consists in passing a quantity of gaseous ammonia and water, with the coal gas, through a series of tower scrubbers, which combine and take up the impurities of the gas, and are then freed from them by means of heat and distillation. The ammonia and water are again passed into the plant to absorb further impurities, and so on to complete the circuit. I have taken great interest in this subject, and will heartily hail any system which may ultimately lead to the purification of coal gas in closed vessels. I am indebted to Messrs. C. and W. Walker for a communication on this subject. They state that the amount of the several impurities passing into the plant at Belfast were as under:—

Ammonia	0·5	per cent.	by volume.
Sulphuretted hydrogen	1·4	,,	,,
Carbonic acid	3·4	,,	,,
Oxygen	0·3	,,	,,
Hydrocyanic acid	0·1	,,	,,
Carbon disulphide	0·03	,,	,,

And that the scrubber liquor that is produced is similar to ordinary gas liquor, and of about the following composition:—

Ammonia	4·0 to 4·5 per cent.
Sulphuretted hydrogen	0·8 to 1·0 ,,
Ammonium carbonate	3·7 to 4·0 ,,

It will therefore be seen that, to effect perfect purification, the supply of ammonia must be equal to about twice the volume of carbonic acid, *plus* once the volume of sulphuretted hydrogen, deducting the ammonia already in the gas, or (say) from 6·0 to 6·5 per cent. by volume of the foul gas. It is also necessary to pump through the circuit between 100 and 150 gallons of liquor for the purification of gas per ton of coal; but this would vary with the amount of impurities. In the Belfast gas it will be seen that there is a larger amount of impurity than usually exists in coal gas. It has been proposed to recover the cyanides from the spent liquor; but as the process of recovery would be somewhat complicated, nothing has been done in the matter. I shall, however, continue to watch this process with great interest; and I trust that it may eventually be successful.

The products of coal tar and ammoniacal liquor have now become of great importance in the world's industry. The present value of the tar and ammoniacal liquor produced in the United Kingdom as bye-products in the manufacture of coal gas is about £2,000,000 per annum. The ultimate value when manufactured into benzol, anthracene, sulphate of ammonia, &c., will probably equal £4,000,000. To this may be added the value of coke—about £2,500,000; making a total of £6,500,000. Previous to 1845 coal tar was practically valueless. At that time A. W. Hoffman discovered that it contained benzene, and proved this by transforming it into nitro-benzene and aniline. Its industrial preparation, however, in any quantity was worked out by one of his pupils, Charles Mansfield, who unfortunately fell a victim to his discovery in 1854. While occupied with the distillation of benzene on a somewhat large scale for the Paris Exhibition, the liquid in the retort boiled over and took fire, burning him so severely that he died in a few days. Since 1854 the manufacture of aniline has progressed rapidly; and to a great extent it has superseded indigo, while alizarine, which Græbe and Libermann discovered in anthracene in 1868, has practically annihilated the importation of madder. The popular opinion is that all coal-tar colours are fugitive to light, while all the good old-fashioned dyes are fast. Professor Hummel, of the Yorkshire College, declared this a few weeks ago to be utterly false, and said he was persuaded that at the present time the dyer had at his command a greater number of fast dyes derived from coal tar than from any other source; and he believed it possible to produce from such dyes—obtained alone, if need be—tapestries, rugs, carpets, and other textile fabrics, which would vie successfully in point of colour with the best productions of the East.

I regret that I am unable to congratulate you on a brisk market and high prices for coal-tar products; unfortunately it is the reverse at present. Some time ago greater profits could be realized by extracting the benzene from coal gas, than by supplying gas for illuminating purposes at 3s. per 1000 cubic feet, such have been the vagaries in prices. Ninety per cent.

benzol, in 1883, was 14s. per gallon; the present price is at 2s. 5d., and this is not the lowest figure for which it has been sold. Anthracene, too, has suffered considerably in price, and will not realize more than 25 per cent. of its former value. These great differences I am unable to reconcile, and will not therefore attempt to venture an opinion upon the subject. During this serious decline in the price of tar products, we have also had to bear a great reduction in the price of ammonium sulphate, from £21 in 1882, to less than one-half in 1891. These are some of the difficulties which we have encountered in the manufacture of coal gas; and they necessarily compel owners of gas undertakings to vary the price of gas from time to time, apart from the variation in the price of coal, and the ever-increasing cost of labour, which are becoming very important factors in our calculations. But ammonium sulphate is now manufactured at most of the large gas-works; and a great saving is the consequence, because the ammoniacal liquor is used on the ground, and thus there is no outlay for carriage. The process is not very intricate, and can be worked with very little difficulty or extra trouble. I would not hesitate to recommend its adoption in all moderate sized works. Some of the largest gas-works have erected plant for the manufacture of sulphate; but unfortunately do not work the plant themselves. They prefer to allow a contractor to work up the liquor, the price of which is based on a sliding scale, according to the selling price of ammonium sulphate. It has often occurred to my mind that this is a bad system, and should be abolished. If not, in all probability the price of sulphate will continue to decrease, as the contractor has practically no interest in keeping it up. The calculations upon which he tenders will no doubt be based upon a certain profit per ton of liquor, whatever the price of sulphate may be, or perhaps he may have a better profit per ton of liquor when the price of sulphate is low. Such a system equally applies wherever the liquor is removed to the contractor's works, if the sliding scale is adopted. I would strongly recommend the abolition of the sliding scale, if only to give the contractor an interest in obtaining the best possible price for sulphate. If this cannot be carried out, then I would advise owners of gas-works to take the manufacture of ammonium sulphate into their own hands. There is practically no nuisance in carrying on the process. The noxious fumes can be readily arrested and decomposed by passing through hydrated oxide of iron, or by the Claus process, which is preferable if the works are of moderate size.

The distillation of coal tar is carried on at very few gas-works. The addition of this branch of industry has not so far found favour in the eyes of gas manufacturers. Many argue that the process is complicated and dangerous. For my part I have never seen it in this light; but I confess that I am very fond of the business. To me it has a peculiar charm, and I should be very pleased if I could devote more time to it. Coal tar contains all the elements of organic chemistry; is a great field for investigation; and I have no hesitation in saying that it has a great future before it. Tar distillation, of course, is a somewhat dangerous process, and should be isolated from the gas-works. The business is a moderately profitable one; but it cannot be expected that gas managers can make themselves acquainted with every branch of the industry—their duties are already multifarious. If tar distillation be adopted, a practical chemist should be engaged to take entire charge of the undertaking. If the two conditions mentioned be given effect to, I fail to see why the owners of gas-works should not distil the tar into its various products—viz., benzol, naphtha, carbolic acid, creosote, anthracene, pitch, &c.; and furthermore manufacture sulphuric acid, which can be readily obtained from spent oxide. Gas coals usually contain from 0·80 to 1 per cent. of sulphur, about one-half of which is volatilized in carbonizing, and is arrested, usually by hydrated oxide of iron, in the process of purification. This quantity of sulphur is capable of making from 27 to 34 lbs. of absolute sulphuric acid—a quantity more than sufficient to neutralize the whole of the ammonia in the manufacture of ammonium sulphate. The remainder could be used for separating tar acids from crude naphtha in the manufacture of benzol, &c. In fact, I fail to see why gas-works, or undertakings in connection therewith, should not be a veritable chemical works. The whole process of the manufacture of gas and utilization of the various products are closely allied to the science of chemistry, and should not be separated. If any profit is to be made by distilling the crude products, why should the owners of gas undertakings not reap the benefit, and hand over the profit to the gas consumer by supplying gas at a lower rate than prevails at present?

The gas industry is assailed on all sides by competitors, and a would-be wise people prophesy its extinction. Some little time ago water gas, made luminous by burning in contact with a comb made of a rare metal, was to supersede coal gas; but I am not aware that this system has made a tithe of the progress prognosticated. Oil is an old competitor, and will continue to be used to a certain extent wherever the charge for gas is high. But in towns where gas is sold at a cheap rate, it is only a question of time to entirely supersede it by gas. Electricity is now considered the great rival of coal gas, and by some people the *beau idèal* light of the future. For my own part, I wish electricity every success. Why should purveyors of coal gas stand in the way of its progress? No permanent advantage can be gained by offering resistance. Give it full scope—in fact, all the assistance one possibly can to reach perfection. When full advantage has been taken of the great sources of power in Nature, the fittest will survive. Great progress has certainly been made during the last decade in developing electricity, but it is yet the light of luxury. The Manchester City Council have decided to supply the electric light to the central portion of the city; but they state that whoever wants it will have to pay for it, as they do for all other luxuries. It is evident that the City Council is fully aware that electricity cannot be supplied as an illuminant as cheaply as coal gas. Some people prefer the electric light as a novelty; but the majority consider the pounds, shillings, and pence side of the question. The great desideratum in the cost of production is motive power. This is a very important item; and until this cost is materially reduced, electricity will not be able to compete, financially, with coal gas as a lighting agent. Many plans have been proposed for utilizing water as motive power. I am not aware that any have been carried out except for very small installations. An important public body in the north has been discussing the desirability of supplying electricity, by means of water power, but has abandoned the scheme, and decided to extend the gas-works. The report of the hydraulic engineer states that, to obtain 200-horse power, about 30,000 gallons of water per minute would be required. With a fall of 28 feet, this is equal to 42,000,000 gallons in 24 hours, sufficient to supply a population three times the size of Manchester. An alternative scheme of a supply of 10,800,000 gallons in 24 hours would give 600-horse power, with a fall of 330 feet. Such a quantity of water would supply a population of 432,000 at the rate of 25 gallons per head. Many corporations who are owners of gas undertakings are very desirous of supplying electricity, but are naturally timid to launch out in consequence of the extra cost that must necessarily be charged in order to avoid loss in carrying on the undertaking. As a means of reducing the cost, the various resources of water, including the supply of water to towns, have been discussed, but none have yet been found practicable. Water, save in very exceptional circumstances, will not be found favourable as a motive power for the supply of electricity.

It is quite natural that corporations should be desirous to be in the van of progress. They are the custodians of the ratepayers' property; and in many towns control the supply of gas and water, and are ever on the alert to adopt any new process for the benefit of the community. Wherever electricity is supplied, corporations or gas companies, or upon whomsoever devolves the supply of gas, should be the purveyors; and they could, without prejudice, allow the public to make choice of their illuminant. The Bradford Corporation have now supplied the electric light for a period of two years. The amount of capital expended is £36,119; and the price charged at present is 6d. per Board of Trade unit. The loss during this period is £2157. Since writing the above, I find that the Bradford Corporation have now completed another half-year's supply of the electric light, and that a net profit of £971 is claimed to have been made during the six months. The Committee appear to be gratified with their seeming success, which is yet, in my opinion, very unsatisfactory, especially when we take into consideration that they can supply coal gas light at about one-third of the price charged for electricity, and that too, despite the fact that a portion of the gas profits is transferred to the borough fund in aid of the rates. The value of the Board of Trade unit is not very significant or expressive except to electricians, and is not so well understood as the solid measure by which coal gas is sold. The Board of Trade unit is equal to 1000 watts; and as 60 watts are required to give a light of 16 candles, one unit will supply 16⅔ 16-candle lamps for a period of one hour. This is equal to a light of 268 sperm candles, for which the Corporation charge 6d. In Lancaster, the town which I have the honour to represent, 20-candle gas is supplied at 2s. 3d. per 1000 cubic feet, and no meter-rents are charged. Therefore 225 cubic feet of gas can be purchased for 6d. This quantity of gas would supply 55½ burners of 16-candle power each for a period of one hour. This is equal to 888 sperm candles; or, in other words, 67 cubic feet of 20-candle gas give an equivalent of light to a Board of Trade unit at a cost of 1·8d., which is 70 per cent. less than the cost of electricity. With regard to cost, the matter is perfectly plain. Coal gas can be stored with infinitesimal loss, and the production need not be varied throughout the twenty-four hours. Not so with electricity. It can only be stored at a very serious cost, and with a loss of from 30 to 40 per cent. The production will therefore vary according to demand, and must necessarily increase the cost of plant, which should also be in duplicate, unless a supply of gas can be turned on at a moment's notice, to prevent serious disaster by fickleness of the electric light.

I venture to predict that coal gas has yet a very important part to play in the world's industry. It will not only hold its own as a lighting agent, but will be more extensively used for cooking, heating, and motive power. The consumption throughout the country continues to increase year by year. The price charged for gas must necessarily vary according to the locality of the works, and the demand for coke and other products. A few corporations are to be commended for endeavouring to supply gas at the lowest possible figure. Wherever this policy has been adopted, the consumption has rapidly increased, and

the cost has been materially reduced, as the increased production does not increase the cost in proportion.

There are many important subjects that I should have liked to have touched upon—viz., the standard of light, the labour question, columnless gasholders, &c.; but I feel that I have already occupied sufficient of the time at your disposal, and must apologize if I have wearied your patience, and thank you heartily for your kind attention.

Votes of Thanks.

Mr. C. E. Jones said they had listened with much pleasure to the address, ranging as it did over a very large number of subjects of special interest to themselves. Many excellent points were alluded to in the address, which, he had no doubt, would receive due attention when they saw it in print. Some of the problems named were not new; but they might be worthy of consideration nevertheless. He (Mr. Jones) was himself in the unfortunate position of having to prepare a presidential address shortly, and he could sympathize with the President, and with the Presidents of kindred Associations, upon whom was cast the responsibility of delivering inaugural addresses. Their thanks were due to the President for an address which had given them all great pleasure.

Mr. J. Hutchinson (Barnsley) had pleasure in seconding the motion, which was carried with applause.

The President having briefly acknowledged it,

Mr. W. W. Hutchinson moved a vote of thanks to the Auditors for their services in the past year.

Mr. Smedley seconded the proposition, which was carried.

Mr. J. Hutchinson proposed a similar resolution in acknowledgment of the services of the Committee and the other officers of the Institution.

Mr. Duxbury seconded the proposition, which was agreed to.

Mr. Newbigging on "Management."

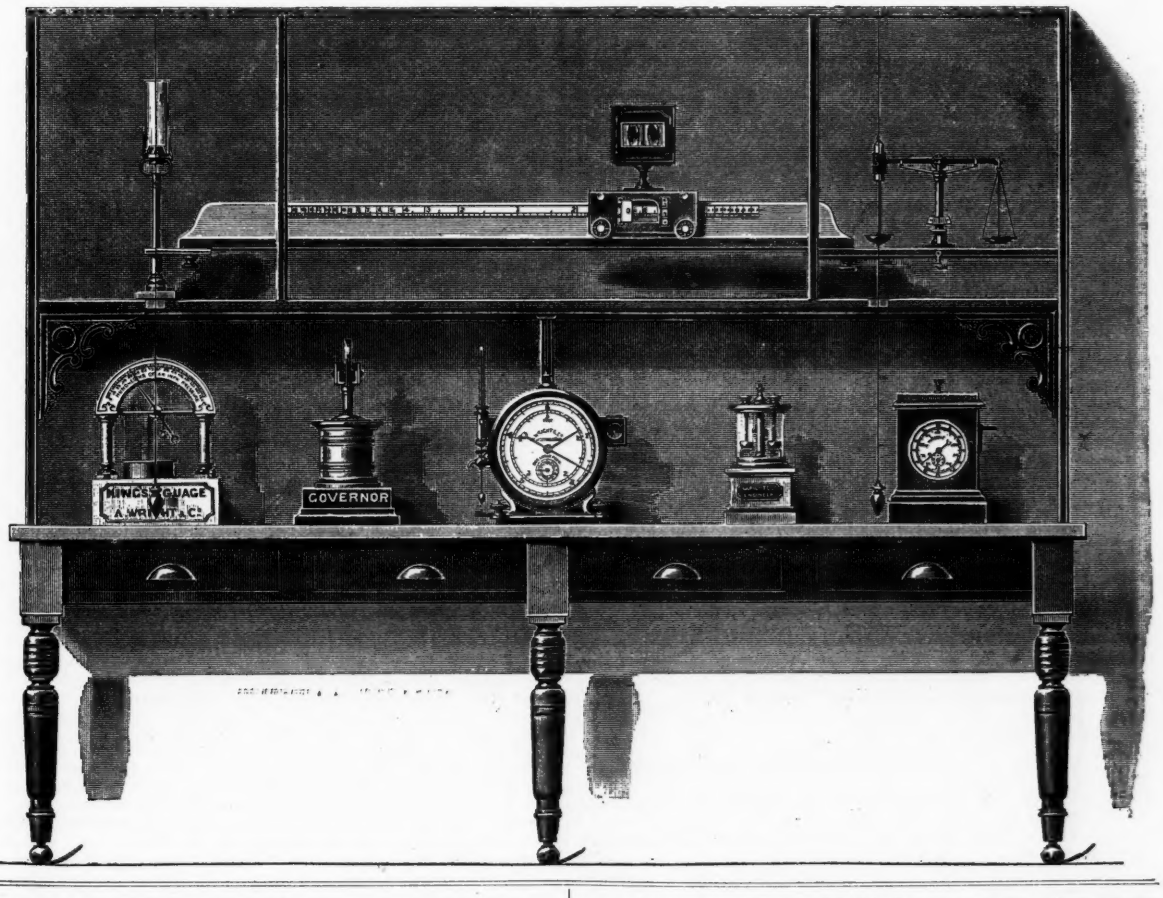
In the absence of the author, the Secretary read a paper by Mr. T. Newbigging on the subject of "Management." This, with a report of the brief discussion which followed, will be given in an early issue.

Subsequently, on the motion of Mr. Veevers, seconded by Mr. Smedley, the thanks of the members were voted to Mr. W. W. Hutchinson and the President for their conduct of the proceedings.

This concluded the business before the meeting; and the members afterwards had tea together.

WRIGHT'S LETHEBY-BUNSEN PHOTOMETER.

The accompanying illustration shows the form of Letheby-Bunsen photometer manufactured by Messrs. Alexander Wright and Co., in accordance with the requirements of the Standards Department of the Board of Trade. The photometer is of the open 60-inch type; and with it testings of gas up to 50 candles illuminating power may be taken. The bar, which is of pine, accurately graduated and calibrated, is mounted at one end on a stiff gas pillar, to which a standard Argand burner may be affixed, and at the other on a wooden table or slab whereon is mounted the candle balance, which, as well as the pillar, is attached to a shelf or base-board, supported 18 inches above the table on two side screens. The disc-box, with silvered glass reflectors, is mounted upon a polished mahogany slide, provided with brass rollers, and carrying a pointer directly underneath, and in a vertical line with the centre of the disc or grease spot. This pointer is illuminated by means of a reflecting prism at the point of observation of the scale. The two screens are so fixed that their outer edges are, in the case of the screen at the burner end, 10 inches from the centre of the gas pillar, and at the candle end 5 inches from the centre of the candle-holder. The screens are securely fixed in a vertical position, and held apart by two pine rods mortised into them at the top edges back and front. Four plumb-bobs are suspended in pairs at either end of the photometer. The accessories consist of a Hartley's candle-balance, King's gauge, an experimental meter, governor, Methven screen, &c. The photometer, with the various appliances connected with it, stands upon a polished pine table having a top 7 ft. 6 in. long and 2 ft. 2 in. wide, framed, with turned legs resting on brass levelling castors of original design, whereby the apparatus may be adjusted to perfect position; and there are four drawers fitted with partitions and arrangements for the reception of the whole of the materials and implements used in photometry. We learn that Messrs. Wright and Co. have in hand at the present time some 30 orders for this form of apparatus for certain of the largest corporations and companies in England.



Death of Mr. E. Fox.—The death is announced, in his 70th year, at his residence at Totland Bay, Isle of Wight, of Mr. Edwin Fox, one of the Directors of the Totland Water-Works Company.

Resignation of Mr. W. Blackledge.—At the meeting of the Chorley Town Council last Thursday, a letter was read from Mr. W. Blackledge, the Gas Manager, resigning his appointment on account of increasing years and infirmities.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Further Standing Orders complied with: Liverpool United Gas Bill; North Shields Water Bill; Oxford Gas Bill; Pontypridd Water Bill; Western Valleys (Mon.) Water (Gas Purchase) Bill.

Bills read a second time: Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water Bill; Barrow-in-Furness Corporation Water Bill; Bradford Corporation Water Bill; Glasgow Corporation Water Bill; Ipswich Corporation Bill; Kilmarnock Corporation Water Bill; Liverpool United Gas Bill; Newport Corporation Bill; North Shields Water Bill; Oxford Gas Bill; Pontypridd Water Bill; Rhymney Valley Gas and Water Bill; Southborough Local Board Bill; Swansea Corporation Water Bill; Swinton and Pendlebury Local Board Bill; Tredegar Local Board Water Bill; Uttoxeter Water Bill; Western Valleys (Mon.) Water (Gas Purchase) Bill.

Petitions against the following Bills have been presented:—

North Shields Water Bill, from the Corporation of Newcastle-on-Tyne.

Pontypridd Water Bill, from Halswell Milborne Kemeys-Tynte.

Rhymney Valley Gas and Water Bill, from the Local Board of Bedwellty and Halswell Milborne Kemeys-Tynte.

Swansea Corporation Water Bill, from the Usk and Ebbw Board of Conservators, the Breconshire County Council, the Newport Harbour Commissioners, the Corporation of Newport, and the Duke of Beaufort.

Swinton and Pendlebury Local Board Bill, from Andrew Knowles and Sons, Limited, and the Barton-upon-Irwell Rural Sanitary Authority.

Tredegar Local Board Water Bill, from the Duke of Beaufort.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Further Standing Orders complied with: Airdrie and Coatbridge Water Bill; East Grinstead Gas and Water Bill; Ormskirk Gas Bill.

Bills read a second time, and committed: Blackburn Corporation Bill; Bournemouth Improvement Bill; Ilkley Local Board Bill; Leeds Corporation (Consolidation and Improvement) Bill; London County Council (Subways) Bill; Middlesbrough Corporation Bill; Newcastle-upon-Tyne Improvement Bill; Rhyl Improvement Commissioners Bill.

Bill withdrawn: St. Pancras Vestry Bill.

Petitions against the following Bills have been presented:—

Airdrie and Coatbridge Water Bill, from the Upper Ward District Committee of the Lanarkshire County Council and Owners of lands and mills on Hilly Gill Burn and Culter Water.

Barry and Cadoxton Gas and Water Bill, from the Barry and Cadoxton Local Board.

Birmingham Corporation Water Bill, from the Corporation of London; London County Council; Guardians of King's Norton Union; Northfield Highway Board; Owners, &c., of fisheries on the River Wye; Breconshire County Council; Sir J. Bailey; Viscount Cobham; Hereford Corporation and Herefordshire County Council; Worcestershire County Council; the Duke of Beaufort, and others; South Staffordshire Water-Works Company; Rhayader and Knighton Highway Boards; Builth Lead Mining Company; Monmouthshire County Council: Radnor County Council.

Blackburn Corporation Bill, from the Blackburn Burial Board, Blackburn Guardians, and the Lancashire County Council.

Brynmawr and Abertillery Gas and Water Bill, from the Abertillery Local Board, the Blaenavon Company, and Philip Samuel Phillips.

East Grinstead Gas and Water Bill, from the Conservators of Ashdown Forest.

Ilkley Local Board Bill, from the Ilkley Gas Company.

Lanarkshire (Middle Ward District) Water Bill, from the Duke of Hamilton, Lord Blantyre, and Ratepayers within the Bothwell Special Water Supply District.

Leeds Corporation (Consolidation and Improvement) Bill, from the Board of Overseers of the Township of Leeds.

London County Council (General Powers) Bill, from the Bromley Local Board, The Gaslight and Coke Company, the New River and other Water Companies, and the Hertfordshire County Council.

London County Council (Subways) Bill, from the Commissioners of Sewers of the City of London; The Gaslight and Coke, South Metropolitan, and Commercial Gas Companies; New River and other Water Companies; Southwark and Vauxhall Water Company; Westminster Electric Supply Corporation.

Middlesbrough Corporation Bill, from Owners, &c., of iron-works and other property in Linthorpe.

Mold Water Bill, from Henry John Potts.

Newcastle-upon-Tyne Improvement Bill, from the Tyne Improvement Commissioners.

Ormskirk Gas Bill, from the Ormskirk Local Board and the Lancashire County Council.

Pontypool Gas and Water Bill, from John Capel Hanbury and the Pontypool Local Board.

Rhyl District Water Bill, from the Rhyl Improvement Commissioners.

Rhyl Improvement Commissioners Bill, from the Rhyl District Water Company.

Stamford and St. Martin's Stamford Baron Gas Bill, from the Stamford Corporation.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, Feb. 26.

(*Before Mr. Justice* NORTH.)

Kirkleatham Local Board v. Stockton and Middlesbrough Water Board.

This was a motion to restrain the defendants from discontinuing the supply of water to the district under the control of the plaintiff Board; but as, since the granting of an *ex parte* injunction, an affidavit had been filed by the Secretary of the Water Board, disclaiming any such intention, the matter now resolved itself into a question of costs. In August, 1891, the plaintiff Board determined, under certain powers contained in their Act of Parliament, to take into their own hands the supply of water to the district under their control, which had hitherto been supplied by the defendant Board; and, in pursuance of this determination, they gave notice of their desire to purchase on Feb. 14, 1892, the pipes and fittings in such district. The consideration offered was £2669; but to this sum the defendant Board objected. After some negotiations, the matter was referred to an Arbitrator, who ultimately fixed the amount at £25,424. The plaintiff Board thereupon took proceedings to set aside this award; and as reported below these proceedings are now pending in the Queen's Bench Division. Meanwhile, as the date fixed for the completion of the purchase, according to the notice given, was fast approaching, and the plaintiff Board having become aware, by reports in the local newspapers, that the defendant Board were taking steps to cut off the supply of water from their district, wrote to the Secretary inquiring whether or not such reports were well founded, and if the Water Board intended to complete the sale on the date named. To this and subsequent communications they received no reply; and consequently, on the 12th of February, application was made to Mr. Justice North to restrain the defendant Board from cutting off the supply after the 14th, whether or not the sale was then completed. This application was granted.

Mr. COZENS HARDY, Q.C., M.P., and Mr. WOOD appeared for the plaintiffs; Mr. BALFOUR BROWNE, Q.C., and Mr. BAGGALLAY represented the defendants.

For the defendants, it was contended that the plaintiffs were not justified in entertaining any such apprehension, and had no right to assume that they would act otherwise than in accordance with the statutory powers by which they were bound. It was argued on their behalf that what they had done, in making certain preparations to cut off the water, was merely for their own protection, and not in any way with the view of acting as it was alleged they intended to act.

Justice NORTH, in giving judgment, considered that the Water Board were in fault in not replying to the communications of the plaintiffs, which they could, he said, easily have done, notwithstanding the temporary absence of their Secretary; and he ordered them to pay the costs of the motion.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Monday, Feb. 22.

(*Before Justices* WRIGHT *and* COLLINS.)

In re an Arbitration between the Kirkleatham Local Board and the Stockton and Middlesbrough Water Board.

This was a case arising out of the recent arbitration between the Stockton and Middlesbrough Water Board and the Kirkleatham Local Board, in regard to the price to be paid by the latter authority to the Water Board for the mains and the privilege of supplying water in the Kirkleatham district. The terms of the award made by the Arbitrator (Mr. H. Law) were given in the JOURNAL for Jan. 26 last.

Mr. FINLAY, Q.C., and Mr. J. G. WOOD appeared for the Local Board; Mr. BALFOUR BROWNE, Q.C., and Mr. BAGGALLAY for the Water Board.

Mr. FINLAY said this was an application to set aside an award, and to send it back, on the grounds that the Arbitrator had included in his valuation matters which did not fall within his jurisdiction, and that, when asked to state a special case for the opinion of the Court upon the legal points raised, to be taken before the award was made, or to make it in an alternative form, he had declined to do so, and had made it in a general form. The arbitration took place under the Stockton and Middlesbrough Corporations Water-Works Act, 1876, the object of which was to enable the Corporations to acquire the undertaking of the Stockton Water Company, and to supply water to the district, which included Kirkleatham, Coatham, and East and West Coatham. It provided that the Sanitary Authority of these places might purchase the portion of the undertaking in their district, and that the price to be paid therefor should be fixed by an arbitrator to be appointed for the purpose by the Local Government Board, on the application of either party; and after such sale the Joint Board were to cease to supply water within the district. The Kirkleatham Sanitary Authority had, under the powers conferred upon them, required the Water Board to sell to them the pipes, mains, and fittings within their district; and a valuation had therefore to be made under section 4 of the Act. The point raised was whether the Water Board were entitled, as they claimed, to be paid by the Sanitary Authority, in addition to the price of the mains and pipes, for the loss of profits or revenue to them in consequence of the abstraction of the Kirkleatham district, including the Coatham parishes, from their area of supply. The Kirkleatham Local Board, on the other hand, contended that the Water Board were only entitled to be paid the value of the mains, pipes, and fittings, on the principle familiar in rating cases in valuing plant as between outgoing and incoming tenants—viz., on the assumption that they were in a condition to be worked at a profit by the person or body taking them over. In other words, that what the Sanitary Authority were going to take over—*i.e.*, the mains, pipes, and fittings—must be valued as part of a going concern. The valuation put by the Kirkleatham Local

Board upon this plant was between £4000 and £5000; and the claim made by the Water Board, on the basis of the profits lost to them by the abstraction of the Kirkleatham district, was upwards of £29,000.

Justice WRIGHT asked if the £29,000 was for profits exclusively, and did not embrace anything else.

Mr. FINLAY said it embraced everything—the Water Board's witnesses putting the value of the pipes, mains, and fittings at between £7000 and £8000. After reciting the provisions of the Act, the Arbitrator stated: "I award the price to be paid by the Kirkleatham District Sanitary Authority for the mains, pipes, and fittings to be £25,424."

Justice COLLINS said there could be no doubt whatever that the profits were included in the award.

Mr. FINLAY agreed, and said that, under section 4 of the Act, profits could not be awarded.

Mr. BAGGALLAY remarked that the Water Board contended, first, that the Court could not go behind the award in the circumstances under which it took place; secondly, that if it were interfered with, its basis was not as had been stated on behalf of the Sanitary Authority; and, thirdly, that the legal construction of the word "price" in the section would, if necessary, have to be contested—this being the question which the Arbitrator had to determine.

Mr. FINLAY proceeded to read two affidavits—one for the applicants, the other for the respondents. The first was by Mr. Sutor, the claimants' Solicitor, stating the acquisition of the water-works by the two Corporations, whose Joint Water Board had ever since supplied the district in question, until notice was given by the Kirkleatham Sanitary Authority for taking over this portion of the undertaking. Then followed the arbitration; and there the Local Board contended that the sum they had to pay under section 4 was the value of the pipes, mains, and fittings, regard being had to their condition, the state of repair, and suitability for affording the required water supply, but quite irrespective of the income derived from them—due allowance being made for depreciation since they were laid. This value they represented as being £4700. On the other hand, the Water Board contended that the measure of the price to be paid for this part of the undertaking was the present capitalized value of the revenue, actual and prospective, lost to the Water Board by having taken from them the right to supply water to the Kirkleatham district, with the customary addition for compulsory sale. At the conclusion of the proceedings, the Arbitrator was asked to state a special case for the opinion of the Court. He did not absolutely refuse to do so; but on Jan. 18, 1892, he published his award for £25,424. The second affidavit referred to verified the proceedings before the Arbitrator, at which Counsel for the Water Board contended that the section would be the most monstrous one ever inserted into an Act of Parliament, if it authorized or enabled a Local Board to leave a Water Board or undertaking without its revenue upon merely paying the value of the pipes, &c., taken over. When the Corporations purchased the works originally from the Water Company, they had to borrow between £700,000 and £800,000; and they were only able to borrow this large amount on the revenue from the undertaking. Accordingly, what they now claimed was the net capitalized value of the revenue derived from this part of the Corporations' water supply area. The evidence of Mr. Fenwick, M. Inst. C.E., for the claimants, proceeded upon an estimate of £1316 for the net income, after allowing for discounts, working expenses, way-leaves, and rents. This sum, capitalized at 28 years' purchase, and making the necessary allowances, brought out a net claim of £29,816 for lost profits or revenue. Another valuer gave the worth of the mains, pipes, and fittings at £6209, or £1000 less than the previous witness. Other valuations of the same plant were £4692 and £4713. It was submitted to the Arbitrator that by going into the question of revenue, he was proceeding on an erroneous principle altogether; and he was asked to state a special case for the purpose of taking the opinion of the Court on the legal points raised—it being urged that this was not the proper construction of section 4. Counsel now contended that there had clearly been a miscarriage upon the arbitration in making the award in this final form, and that great injustice would be done if the Local Board were precluded from raising the question. Taking the figures on their own basis, the Water Board were not entitled to claim more than £2000 to £3000, instead of £7000 or £8000, for the pipes, &c., in question. Corporations were not obliged to take over reservoirs, and they might lay down their own plant, at their own expense, for serving the district, or make any bargain they chose with a water company, or even with the very body from whom they were buying, to sell a supply of the water at a certain rate per gallon. The Act provided: "That the Joint Board, when constituted, shall, if required, sell to the Sanitary Authority all mains, pipes, and fittings within the district—the price to be fixed by arbitration; and that after such sale the Joint Board shall cease to supply the district with water." Now, what the Water Board had obtained here was compensation for their loss of revenue, whereas it was impossible to find in the section that anything but the value of the pipes, mains, and fittings was to be paid for.

Mr. BALFOUR BROWNE contended that no reason whatever existed for interfering with the Arbitrator's award; and that, in fact, the Court had no jurisdiction to touch it—this being in the nature of a voluntary, and not a compulsory arbitration. In such cases, the ordinary jurisdiction of the Court was ousted; and everything—even questions of law, should they arise—must be determined by the Arbitrator. In any case, if the Court were in a position to interfere, it would not send back the award for reconsideration unless the Arbitrator had taken into account matters which he ought not to have regarded, and would certainly not do so upon a mere suggestion that he might have adopted a wrong view of the legal points. The fallacy of the applicants was in supposing they had the right to make the supply; but the Water-Works Clauses Act provided that where a company already existed, by statute, for supplying water, the local authority of the district should not be entitled to do it, so long as the company was in a position to give a proper and sufficient supply for all purposes. That was the case here. In this district, water was already being supplied by a Company; and the Local Board could never have acquired the right of supply at all, but for the words in section 4 of the Act of 1876, providing that after the purchase there should be a cesser of the Water Board's right to supply. It was not the intention of Parliament that these large undertakings should be dismembered and split up; and it never meant that the value of the pipes and mains as old iron, and the mere cost of laying them, were to be the measure of compensation. The question for the Arbitrator to determine was the value of this plant to the seller, and not to the purchaser. This principle had been distinctly laid down in many compensation cases. Once laid, the pipes became of far greater value, in regard to the water to be supplied through them. The Act of Parliament did not provide that arbitrators were to value the dry pipes; and clearly what the Local Board bought was the right of supply.

Justice WRIGHT said the Court had not to decide whether or not the Arbitrator had proceeded upon a wrong principle. The Act of Parliament left it to him to find the price at which certain things were to be sold or taken over. If the Court could see that there was really ground for saying that the Arbitrator had followed an improper course, it had power to require him to state his award in the form of a special case, so that the matter could be submitted for its decision. There appeared strong grounds for judging that he had given compensation in respect of the cessation of the Water Board's power to afford a supply of water to the district, or that he had taken into consideration, as his guiding principle in the matter, the loss of revenue sustained by the Board by reason of their ceasing to supply the district. If this were so—if he were wrong in taking this view—it would certainly be unjust to allow the award to stand without giving an opportunity to the parties to contest it as a question of law. Accordingly, the matter must be referred back to the Arbitrator, under the 10th section of the Act of 1889, for the award to be stated in the form of a special case, to be remitted for the opinion of the Court.

Justice COLLINS concurred.

COUNTY OF LONDON ASSESSMENT SESSIONS.

Sessions House, Clerkenwell, E.C.—Friday, Feb. 26.

(*Before Sir* P. H. EDLIN, Q.C., *Chairman, and a Bench of Magistrates.*)

The Gaslight and Coke Company's Assessment Appeals.

The Counsel in this case attended to-day, as arranged, with the view of obtaining the final judgment of the Court as to the allocation of the amount of rateable value fixed amongst the various parishes.

Mr. LITTLER said he did not desire to re-open anything that had taken place on the previous occasion; but, on the assumption that he had any rights, he wished to say that all that he did now was under protest, though he was willing to do what he could to assist the Court and the other side.

The CHAIRMAN said he was not quite sure that he correctly appreciated the expression "under protest." Mr. Littler was there as Counsel in an exceedingly important case for a very important public Company; and the Court had listened, and given great attention to everything that had fallen from him in the course of the long proceedings. He thought it would be better that Mr. Littler should withdraw the expression, because he (the Chairman) should really not allow it. The judgment of the Court had been given, or an interlocutory judgment had necessarily been given, in the matter; and the Court were asked to put an interpretation on the words they used in expressing their opinion contrary to that which was intended. Now that judgment had to be carried out; and he had requested the loyal assistance of everybody—and had no doubt he should receive it on both sides—for the purpose of giving effect to it.

Mr. LITTLER said they felt it to be a very important matter; and therefore he wished to preserve the position of his clients, as he had done hitherto.

The CHAIRMAN remarked that Mr. Littler had done so hitherto; and it was absolutely impossible that there could have been a finer grasp of the position in which the Company stood than that which was shown by Mr. Littler's conduct of the matter. They had had a very difficult task—Heaven forbid that he should have such another—and he did not think that anything Mr. Littler had urged had been overlooked.

Mr. LITTLER said there were three matters for consideration—first of all, the directly-productive mains; secondly, the indirectly-productive mains; and, thirdly, the stations, where there were any. With regard to the first, Mr. Field had worked out the figures; as to the third, it could be got rid of by Mr. Ryde's schedule; but in respect to the second, there was some difficulty. Correspondence had taken place with Mr. Ryde on the matter; but as he was only engaged for three parishes—St. Pancras, St. Giles'-in-the-Fields, and St. Marylebone—that gentleman felt that he could only deal with the amounts for those parishes. On the 24th inst., Mr. Field had a long interview with Mr. Ryde; and he was pressed as to how the £1223 which he assigned to St. Pancras was made up. He then explained that there were 5183 yards of 24-inch, 800 yards of 26-inch, 197 yards of 30-inch, and 3846 yards of 36-inch main; whereupon it was pointed out that he assigned to St. Pancras, according to this, rather more than twice as much 24-inch unproductive mains as was allowed to the whole of the parishes supplied by the Company. Then, again, St. Pancras was credited with 800 yards of 26-inch main; while this diameter did not appear in Mr. Ryde's statement at all, and there was nothing to be allowed for it. Then Mr. Ryde said this was immaterial, because any allowance for it might be taken from the sum of £5998 given as the value of the testing-stations, &c., which, his Lordship would remember, was the last figure that made up the £250,000; and he said this was an odd sum arrived at for the purpose of completing the amount.

The CHAIRMAN asked if this was not a matter for the parishes to fight out amongst themselves.

Mr. LITTLER said it was not entirely so, for the reason that there were other parishes in which there were no appeals; and therefore to this extent the Company were interested, because they must take care that it was so distributed that they were not rated twice over.

The SOLICITOR-GENERAL said he was sensible of the way in which the appellants had now endeavoured to deal with the judgment which his Lordship had given; and he was glad to acknowledge that the parishes he represented had received from the appellants' Solicitors the figures which they worked out in respect to the directly-productive

mains; and the difference between these figures and those which the Surveyors on his own side had prepared for the information of the Court was so trivial and insignificant, that he would be prepared at once to accept the figures that the Company's representatives had produced. In one case, in which the amount of the assessment now arrived at exceeded the sum of £17,000, the difference between them was only £8. He suggested that it would save time if his Lordship would adjourn the proceedings till another day, to enable them to further consider the figures.

The CHAIRMAN: Do those figures relate to the indirectly-productive works?

The SOLICITOR-GENERAL: No, my Lord.

The CHAIRMAN: Then what you are now saying has no direct relation to what has fallen from Mr. Littler?

The SOLICITOR-GENERAL replied that it had not; it was in addition to it. He was only anxious to get the actual application of his Lordship's judgment. The figures which had been supplied to them that morning were in this form: Parish of St. John, Hackney—gas meter and stove rental for the account year, £110,904; then value of directly-productive mains, at 19·67 per cent. on the rental, which was the rateable value *plus* rates, £21,115; rates, at 5s. 5¼d. in the pound, £4663; net amount, £17,152. The amount that had been arrived at by his clients was £17,160—only £8 difference.

The CHAIRMAN remarked that this showed that the greatest possible attention to the calculation had been given on both sides. He thought they might accept this result as excellent evidence of such attention.

The SOLICITOR-GENERAL said that a sweet reasonableness had set in on both sides. There was, however, a divergence of interest between the parishes represented by Mr. Ryde and those represented by other persons; and he had no doubt that, if an adjournment were granted, the figures could be amicably worked out.

Mr. LITTLER agreed that they could not go much further into the matter then; but with regard to the question of "sweet reasonableness," he wished to point out that, according to Mr. Field's return, they were actually rated at 19·67 per cent., whereas with the South Metropolitan Company the greatest amount was 10 per cent.

The CHAIRMAN observed that this might involve considerations later on.

A further discussion ensued, in the course of which the Chairman suggested that the differences between the parishes should be referred to Mr. Vigers, who, although retained by the appellants, was not called as a witness. This, however, was objected to by Mr. Poland; and the suggestion was withdrawn by the Court.

Mr. FULLARTON, on behalf of the parish he represented, pointed out that the assessment was £1077 gross and £897 rateable value, whereas the Company claimed £481 gross and £391 rateable value.

The CHAIRMAN: How does the judgment work out?

Mr. FULLARTON said that, according to the Company's own view, it worked out to a rateable value of £1222, as against £897 on the assessment—actually £400 above what was on the valuation list.

The CHAIRMAN said the Court had no power to increase the assessment. This might possibly have been a power which an arbitrator would possess in the matter; but the Court could not do it.

Mr. FULLARTON asked his Lordship for judgment, with costs, in respect of his parish.

The CHAIRMAN stated that he should not deal with the question of costs until he had the whole of the figures finally before him.

Mr. MARSHALL, for the parish of Chelsea, said that, after this intimation, he should not press for judgment at present; otherwise he should have had to make the same application as Mr. Fullarton.

It was arranged that the parishes should have an opportunity of nspecting the plans of the Company, so as to ascertain the lengths of the mains; and after the Chairman had referred to the remarks of Mr. Danckwerts on the previous occasion, and maintained that the Court had power to act, even though it was not constituted as it was previously, the proceedings were further adjourned till Saturday, the 12th inst.

WEST LONDON POLICE COURT.—Saturday, Feb. 27.

(*Before Mr.* CURTIS BENNETT.)

Water Companies' Powers of Cutting Off Supply.

To-day his Worship gave judgment in an adjourned summons taken out against the Secretary of the Chelsea Water-Works Company in respect to cutting off the supply of water to premises in the occupation of Mr. J. T. Elgar. The matter had stood over to allow his Worship to look through the statutes. The facts are fully stated in the judgment.

Mr. BODKIN appeared on behalf of the Company, and wished to address the Magistrate; but he declined to hear him.

Mr. CURTIS BENNETT said: This is a summons taken out under section 48 of the 34 & 35 Vic., cap. 113 (The Metropolis Water Act, 1871), under the following circumstances: The complainant entered into possession of certain premises at 667, Fulham Road, from Sept. 30 last; and in the month of November, he received a printed demand-note to pay the amount (not specified) for the water-rate. The previous note, left in October, did not reach him; but this had contained the amount. In December he received the final notice to pay the sum of 6s. 11d. for one quarter and a half-quarter, up to Christmas, on or before Jan. 18. On that day I find he had attended at the office of the Company, taking with him the deposit receipt for £2 which he received from the landlord on taking possession on Sept. 30, and produced it to the officer of the Company to prove that he had only entered into possession on that date, and therefore was not liable for the water-rate from Aug. 6 to Sept. 29, which the Company claimed from him. As to this I find the complainant was perfectly correct, as the section under which this summons is taken out enacts that "the incoming tenant shall not pay the arrears unless there is an express stipulation with the outgoing tenant to that effect." On this occasion I find the complainant offered to pay, and tendered in payment, the amount due from him—namely, the quarter up to Christmas; and this was refused by the officer of the Company. On Feb. 6 a representative of the Company called upon the complainant, and again demanded payment of a sum which they had no right to demand from the complainant, who again produced the deposit note and offered to pay all that was due from him. This was again refused; and the Company's officials then took the very high-handed, and in my opinion absolutely monstrous, steps of cutting off the supply to the complainant's house, because he refused to pay for that for which he was not liable. But I have looked through all the Acts relating to Water Companies, and I do not find that I can inflict any fine upon the Company for this act, although the health and happiness not only of the complainant, but also of his neighbours, were endangered thereby. The complainant was then kept without water for seven days; and not until the case was brought before the Court was the water supply restored. The complainant says that on Feb. 6, when the Company's official called upon him, he offered to pay the proper amount up to Lady-day—namely, a quarter in advance in addition to the quarter due at Christmas; and I find that he did so. But then the Company say, under sections 56 and 70 of 10 Vict., cap. 17 (the Water-Works Clauses Act, 1847), the water-rate must either be actually paid or "tendered" in advance for a quarter before any complaint can be made for cutting off the water, and therefore the Company are not liable for the penalties imposed by section 43 of this Act. This leads to the consideration of what "tender" is as set out in the Act. The complainant, I find, did not actually produce the amount in payment, but only said "I will pay you"—putting his hand into his pocket, in which was money. But I hold that the tender must be a legal tender, which, to be good, must be actual tender of the very amount. This I find the complainant did not do; and therefore, hardly as he has been used by the Company, he has no legal remedy. I should like to point out all through the various Acts every provision is in favour of the Water Companies, and against the consumer. For instance, if any neighbour had given the complainant a glass of water when his supply was cut off, such person would be liable, under section 58 of the Water-Works Clauses Act, 1847, to a penalty of £5. The complainant even rendered himself liable, under section 59 of the same Act, to a penalty of £10 for consuming any of the water from the pipe to his house before making an agreement with the Company, although he found the water in the house ready for use; and he has always been ready and willing, and offered, to pay for the water since he took possession of the premises. Legislation is imperatively needed to give the consumers some set-off against the present powers of the Water Companies, who supply that which is absolutely essential for health and life, and without which people cannot live in the Metropolis. At present, although persons have duly paid all rates demanded from them—say, in October up to Christmas—on Dec. 26, or on any subsequent date before another payment, the Companies have power, without any notice, to cut off the whole of the supply to London. A short Act would, in a great measure, meet many of the difficulties; and I suggest the following:—

> That it shall not be lawful for any water company to cut off the supply at any time existing to any premises for non-payment of any water-rate, without first leaving, either with the owner or occupier thereof, or affixing on some conspicuous part of such premises, a notice stating the amount due to them for any water-rate and giving 14 days for the payment of such amount; and if any dispute should arise between the parties as to the amount due, either party within the said 14 days may apply to any Court of Summary Jurisdiction for a summons against the other party to hear and determine what amount is due. Should any water company cut off any water supply to any premises contrary to this provision, the company shall forfeit the penalty of £20, and the further penalty of £5 for every day during which such supply is so cut off. Provided always that if the Court shall be satisfied that the water has been cut off solely on account of any necessary repairs to the works, or mains, or pipes of the said company, then the company shall not incur any penalty for cutting off the water.

In my judgment the power of cutting off the water supply to any premises for non-payment of water-rates should be absolutely taken away from the Companies, for that which to life and health is essential should not be so dealt with. The remedy should be that, if the water-rate is unpaid 14 days after having been demanded, the Companies should have power to recover the amount due in a Court of Summary Jurisdiction, in the same way as poor rates are now recoverable. And within the 14 days of the demand, the person from whom the rate is demanded should have the power to dispute the same by a summons in a Court of Summary Jurisdiction.

The summons was then dismissed, without costs.

Sales of Shares.—At West Hartlepool yesterday week, a number of shares in the *Hartlepool Gas and Water Company* were sold by auction. Thirty fully-paid "D" shares of £10 realized prices ranging from £16 12s. to £16 15s.; and three £10 "D" shares (on which £2 only was paid up) produced £7 12s. each.——Last Thursday, at Folkestone, nine £10 shares in the *Folkestone Gas Company* were sold at the rate of £23 5s. each; seventeen 7 per cent. shares realizing £17 2s. each.

The Estimates for the Birmingham Water Scheme.—Mr. J. Mansergh, M. Inst. C. E., the Engineer of the water scheme of the Birmingham Corporation, has prepared his parliamentary estimate of the expense of the undertaking. Including all works and contingencies, he sets it down at £5,851,000. In this estimate the cost of constructing the 3¾ miles of railways in Wales is put at £26,950. The object of these lines is "to facilitate the construction and maintenance of the water-works."

The Lead-Poisoning Question at North Bierley.—In the course of the report of the Medical Officer (Dr. Logan) presented at the last meeting of the North Bierley Local Board, he stated, in reference ot lead-poisoning, that it had been somewhat prevalent throughout the greater part of the district, but seemed to be more intense during certain months—for instance, in August and September. The months of increased intensity apparently coincided with an increased growth and decay of certain minute organisms, which, on reaching the lead supply-pipes, dissolved or determined the solution or disengagement of a sufficient amount of the mineral to affect those persons susceptible to its toxic operation. The greater part of the district, it was added, was supplied from the Bradford high-level service.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Report and Accounts.

The report which the Directors of the above Company will present to the shareholders at their half-yearly general meeting on the 14th inst. is very short; but the accounts by which it is accompanied are considered satisfactory, and consequently the payment of the maximum dividend will be recommended. The receipts from the sale of gas in the six months ending Dec. 31 last amounted to £99,257, as compared with £97,872 in the corresponding period of 1890; the meter and stove rental was £4932, against £4767; the residuals produced £37,725, as compared with £41,230—the total revenue being £144,314, as against £146,329. The expenditure incurred in the manufacture of gas was £95,542, against £100,929; in its distribution, £8593, against £6790; the management expenses were £5441, as compared with £4181; and the total expenditure was £116,849, as against £118,324. The balance carried to the profit and loss account is now £27,465, as compared with £28,005 this time last year. The sum available for division was then £45,107; it is now only £35,702, which comprises £5546 taken from the undivided balance of the past half year. The dividends on the various classes of stock will come to £34,493; so that there will remain a balance of £1209 to be carried forward. The reserve fund (which is at its maximum) stands at £78,618. With regard to the Company's manufacturing operations, coal cost £52,005 in the past half year, as compared with £54,895 in the latter half of 1890; and the Directors explain that, though the Company benefited somewhat by the reduced price paid for raw material, the advantage gained was neutralized by the smaller amounts obtained for coke and other residuals. The quantity of coal carbonized was 78,438 tons; of cannel, 18,443 tons—together, 96,881 tons. The products were: Coke and breeze, 58,581 tons; tar, 6352 tons; ammoniacal liquor, 3,015,500 gallons. For the latter half of 1890, the figures were: Coal, 79,991 tons; cannel, 16,241 tons; coke and breeze, 59,114 tons; tar, 6155 tons; ammoniacal liquor, 2,670,275 gallons. Of the £693,678 raised on capital account, a sum of £666,052 has been expended; leaving a balance of £27,626. The Company have £92,510 of share capital issued, but not paid up, and £6222 remaining to be issued; also borrowing powers to the extent of £76,073 unexercised.

CROYDON COMMERCIAL GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday at the Offices, Katherine Street, Croydon—Mr. CHARLES HUSSEY in the chair.

The SECRETARY (Mr. W. J. Russell) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he exceedingly regretted that, in taking the chair, his first duty should be to have to refer to the great loss which they had sustained in the directorate by the death of Mr. Charles Newton, who had been for more than 26 years a member of the Board, and for nearly five years their Chairman. He went on to speak of the eminent services rendered to the Company by Mr. Newton. Having, he remarked, been a Director of no less than nine gas companies and an Auditor of two, he brought a great amount of experience to bear upon his work; and the Board felt they had lost a valuable colleague, and the shareholders a valuable servant. To fill the vacancy, they had elected Mr. J. Pelton, whose knowledge of business matters would be of great advantage to the Company. Directing attention to the working of the half year, the Chairman stated that there had been an increase in the quantity of gas sold of 2,487,500 cubic feet, or 1·16 per cent. This was not their usual increase; but seeing that they compared it with the very abnormal half year of 1890, it could not but be considered satisfactory. The second half of 1890 showed an increase of 10 per cent. in comparison with the corresponding period of the previous year; and this was accounted for by the severe weather in November and December. If they took the whole of 1891, it would be seen that they made an advance of 5·55 per cent., which was very gratifying. Taking the two years 1890 and 1891, they had an increase of 10·3 per cent.; while in the ten years from 1881 to 1891, they actually showed an advance of 70·9 per cent. Turning next to the residuals, he said he was sorry to say that this portion of their business had not been so profitable during the half year. From coke they had not received gross so much by £1646; breeze and tar had produced less; and, in fact, all residuals had been at a bad price for gas companies. The total difference in the gross prices realized between the December half of 1890 and 1891 was £2309; but notwithstanding this, by the excellent management of their Engineer (Mr. J. W. Helps), he had been able to reduce that in the balance-sheet by £641. With regard to gas cooking and heating stoves, they had made rapid strides; and they were trying to foster this branch of their business as much as they could. The number of additional stoves sold was 144; cooking-stoves on hire, 81; and heating-stoves on hire, 102—making a total of 327, or an increase of 20·50 per cent. The total number of stoves on hire to Dec. 31 last was 1778. Since the previous meeting they had sold 500 new shares; and, in disposing of them, they had departed somewhat from the old lines of doing so. Instead of putting them up to auction, they had sold them by tender; and the amount realized was £11,224—giving the Company the handsome sum of £6220 of non-dividend paying capital. For the 500 shares, the Directors received 854 applications; and the average price realized was £22 9s. per share. Dealing with the improvements which had been made at the works, the Chairman said it would be remembered that at the last meeting it was stated that the Directors intended to spend a certain sum in the erection of new plant. Since then they had added a third lift to one of their gasholders. They had taken away an old station meter which was only capable of passing 45,000 cubic feet per hour, and replaced it by one that will pass 100,000 feet per hour. They had disposed of the old meter; and this considerably reduced the expenditure on the new one. They had also built a new governor-house; and put in two governors of an improved type. During the present year, they were proposing to build another retort-house. Their Engineer had been put under the greatest strain during the winter to meet the demand for gas, which had had to be sent out from the works as quickly as it was purified; and the new retort-house would relieve them of much anxiety for some time to come. They also contemplated the erection of a new scrubber, capable of doing four times as much work as the present one. Referring to the prepayment system of supplying gas, he said that it had only been adopted by the Company about two years. They had, however, already fitted up 301 cottages under it; the increase during the past six months having been 104, or 52·79 per cent. Each cottager paid at the rate of 3½d. per 100 feet; and he thought that the results achieved must be considered very satisfactory. The Chairman then referred at some length to the establishment by the Board of a superannuation fund, for the benefit of those workmen who might be incapacitated from performing their usual work; and he stated that, acting under legal advice, they had, for the purpose of making the fund financially sound, placed to the credit of five Trustees the amount of the Actuary's (Mr. Mark Knowles's) valuation. The Directors had been induced to go into this for two reasons. The first was to teach the men to be thrifty, and to save something that would be serviceable to them in their old age; and, in the second place, to endeavour to foster a feeling of good-fellowship between employed and employers. Continuing, he observed that the Directors recommended that the salary of the Secretary should be increased by £50 per annum; and, in justification of this proposal, he pointed to the great expansion of the business, and the consequent increased responsibility and labour which fell upon Mr. Russell. In 1879, when the returns were £51,829, the Secretary was receiving £400; and in 1892, with receipts amounting to £87,208, they proposed to give him £600. Mr. Russell had been in the service of the Company from 1863; and the manner in which he performed his duties had given the Directors great satisfaction. Regarding the dividend, the undivided balance amounted to £19,041, out of which the Board recommended the payment of dividends at the rate of 14 per cent. per annum on the capital of £51,600, and 11 per cent. on the capital of £137,000 for the half year, and at the last-named rate on the new capital of £5000 for the three months ending Dec. 31, all less income-tax. These dividends would amount to £11,312, and leave a balance of £7729 to be carried forward. As to the accounts, it would be seen that there was the addition to the capital of the £5000 already referred to; and £4768 had been expended in new plant, &c.—the balance of capital amounting to £6453. Touching the revenue account, £27,330 was received from private consumers; and for public lighting, £3767. This was a slight increase in the sales; but it had been borne down by the loss on residuals. Still they were able to pay the dividends out of the profits made; and there were scarcely any gas companies who were able to do this on the working of the past half year. The amount of coal carbonized in the six months was 21,736 tons, compared with 21,445 tons in the corresponding period of 1890. The average quantity of gas made per ton of coal was 10,652 cubic feet, of which they sold 9964 feet.

The DEPUTY-CHAIRMAN (Mr. A. J. Lambert) seconded the motion, which was carried unanimously.

On the proposition of Mr. W. HYSLOP, seconded by Mr. J. C. BENWELL, the dividends recommended were declared.

The retiring Directors (Mr. H. Chasemore and Mr. A. J. Lambert) and Auditor (Mr. Benwell) were re-elected; and, in accordance with the Directors' recommendation, a resolution was passed increasing the salary of the Secretary by £50 per annum from Jan. 1 last.

The usual complimentary votes were passed; and the proceedings then terminated.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Guildhall Tavern, Gresham Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY (Mr. Alfred Lass, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts (which were alluded to in the JOURNAL last week) were taken as read.

The CHAIRMAN said he had no doubt that every one of the shareholders had gone through the balance-sheet with more than ordinary interest. The crisis through which all gas companies were now passing, due to the increased price of coal and labour and the bad market for coke, would, he was sure, have interested the shareholders so much that they would have looked with the greatest satisfaction at the position in which their own Company stood. Taking first the gas branch of the business, they found that the revenue for gas had amounted to a sum exceeding £7000; and it was the first time in the history of the Company that the receipts for gas had reached that figure. The gas produced in the half year had been nearly 2,750,000 cubic feet more than in the corresponding six months of 1890; resulting in an increase in the revenue of about £515. With regard to the residuals, there had been a small decrease. But this arose principally in relation to the tar; for in the corresponding period of 1890, they opened a tar-well which had been closed for some time, so that they then had more tar for disposal. Compared with the December half of 1890, the total revenue showed an increase of £434. Turning to the expenditure side of the account, under the heading of manufacture, they had had to pay away something more. Coal had cost them an additional £239; but as they obtained £515 more for gas, he thought they might congratulate themselves upon having done very well. The other items were so much like what they had been in previous years, that he did not think he need refer to them. The plant had been well looked after by their Engineer (Mr. T. H. Martin); and it was in good working order. In connection with the water undertaking, he said that the increase in the business had continued, but at a less rapid rate than in the preceding two or three years. There

had not been so much building going on in the past two years; but this could not last long, as building operations must proceed in a district like Barnet and Finchley. The Company's revenue for water had amounted to more than £7000—a sum they had never had before. Both branches of the business were therefore healthy; both were doing well; and both held out the prospect of doing even better in the future. He concluded by moving the adoption of the report and balance-sheet.

Mr. C. HORSLEY seconded the motion.

Mr. THOMPSON called attention to the item in the gas revenue account of "wages and gratuities at works, £564," and asked how much of this sum was for gratuities.

The CHAIRMAN replied that it was nearly all wages; only a few pounds having been spent in gratuities.

Mr. WAKEFIELD considered that the balance-sheet was a very satisfactory one; but he was rather surprised that the gas business had not increased to a greater extent, because he had observed, when he had been to the gas-works, that building was going on in Oakley Park. [Mr. MARTIN: We do not supply gas there.] That, continued Mr. Wakefield, was unfortunate. Everywhere, when one saw houses were being built, they were told that somebody else had the right to supply the gas. Having complained about the price charged for water, he referred to the question of the coal supply. About two years ago, at a meeting of the Great Northern Railway Company, he suggested that they should give greater facilities for getting coal from the district lying between Mansfield and Chesterfield. At that time the Company did not seem to think much of it; but at the last meeting, the Chairman told him they were going to do something in that direction. If coal from the district referred to was good for gas making, he suggested that the Directors might, by making a direct connection, save a good deal in their manufacturing expenses.

The CHAIRMAN, in reply, remarked that the little gratuities they had given to their workmen had been attended with great advantage. With respect to the charge for water, he said their Act of Parliament did not allow them to alter it; so that it could not have been increased. As to the greater facilities for getting a supply of coal, the Directors would be very glad to see them; but he could assure the proprietors that they kept their eyes open to see what could be done in this matter. He thought their present coal supply was good, and it was carbonized very well; for they obtained from it 10,600 cubic feet of gas per ton. He also mentioned that the increase in the gas sold during 1891 was 10 per cent.

The motion was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. HORSLEY, a dividend for the past six months was declared, less income-tax, at the rate of 8 per cent. per annum on the "A" and "C" stocks, 7 per cent. on the "B" stock, and £5 12s. per cent. on the "D" (water) shares.

The retiring Directors (Messrs. A. H. Baynes and J. W. L. Glaisher, Sc.D., F.R.S.) and Auditor (Mr. F. Lennard) were next re-elected.

Votes of thanks were passed to the Chairman and Directors and the various officers for the faithful discharge of their duties during the past half year; and the proceedings then terminated.

CORK GAS CONSUMERS' COMPANY.

The Half-Yearly General Meeting of this Company was held on Thursday, the 18th ult.—Mr. T. MAHONY in the chair.

The SECRETARY (Mr. Denny Lane) read the notice convening the meeting, and also the report and statement of accounts for the six months ending Dec. 31, 1891. An abstract of these appeared in the JOURNAL last week.

The CHAIRMAN, in moving the adoption of the report and accounts, said it was very gratifying to find that the consumption of gas was steadily advancing; it being a considerable time since there had been so large an increase in private lighting. Generally, the Directors had had to be satisfied with an improvement of from 1½ to 2 per cent.; but the past half year showed an increase of 4 per cent. This was the more gratifying as some large establishments were supplied with electric lighting—the electricity being generated by steam and not by gas engines; and it proved what the Directors had always asserted, that lighting by gas and electricity might co-exist without any damage to the former. In a very extensive concern, where both systems of lighting had been in use for some years, a large addition had recently been made, and this was to be lighted with gas instead of electricity. The increase of gas consumption had been so great with many companies, that the engineers had been driven to the greatest straits to provide a sufficient supply of gas, and had, at considerable cost, been obliged to supplement their coal by the use of oil. The Company's prospects were very good; and in some districts it would be necessary to enlarge the mains to meet the demand for gas. The use of gas-engines was also increasing; and in this connection he remarked that the price charged for gas supplied for motive power was about 3d. per 1000 cubic feet lower than that obtained in London on the north of the Thames. It was very satisfactory for the Directors that they had not had to raise the price of gas, as so many other companies had been compelled to do. For instance, the Chartered Company, in London, had advanced their price by 7d. per 1000 cubic feet, which was equivalent to an additional tax of £600,000 a year on their consumers; and yet within the last three years they had taken from their reserve fund the following amounts: First year, £106,623; second year, £344,376; third year, £308,578—making a total of £759,577, and leaving only £115,244 in the reserve, or about one-third of the sum withdrawn in the last year. In Cork they had not advanced the price—in fact, the Directors had rather made concessions to those who used gas for motive power; and although on more than one occasion it had been necessary to resort to the reserve fund, it was still about 8 per cent. more than it was five years ago. Of course, this was to be accounted for, in a great measure, by the favourable contracts made for coals when they were at or near the minimum price. These contracts had now expired; but if the sales of gas continued to increase as they had done, there was every reason for hoping that it would not be necessary to advance the price. The Directors anticipated that the current half year might not yield so good a net result as that ending in December last; and the shareholders must be prepared for the possibility of a draft upon the reserve fund to supplement the earnings for the summer dividend. But, taking the whole of 1892, the Directors trusted the results would be satisfactory to the proprietors. Referring again to the electric light, the Directors still held that if this system of illumination were required in Cork, the Company were in a better position than any other body to supply it. Their present staff could, without difficulty, execute the greater part of the duties, which would be discharged by a separate and expensive body of officers if any other organization undertook the supply. Last October the Secretary addressed a letter to the *Electrician* newspaper—and it was copied into several other technical newspapers—pointing out that, in the present state of science, gas-engines and gas-mains afforded the cheapest and most efficient mode of distributing electricity.* No one had yet denied the soundness of his conclusion; and as it was freely admitted that he knew not only something, but a great deal of both sides of the question, the Directors believed his opinion was of very considerable weight. If that was so, the conclusion must be that the Company were the most suitable purveyors of the electric light for the city. They did not expect, however, that the demand for it would be very large, when, in a wealthy city like London, where the price was not half that charged in Paris, the number of consumers was so small. Although some brilliant experiments had lately dazzled the public—experiments of the highest interest from a scientific point of view—it was believed that no improvement whatever had taken place in the condition of practical illumination by electricity. Passing to another subject, the advantages to be gained by the use of a steam-roller in the maintenance of the city roadways had been several times discussed by the Town Council; and the objections put forward on the part of the Company had been, the Directors considered, quite misunderstood. Being, as the Company were, the largest ratepayers, and therefore interested in aiding any economy of the rates that could be carried out with safety to the lives and property of their fellow-citizens, and being aware of the risk of damage to the gas-mains (which in some cases had only 18 inches of cover) which were almost certain to occur, from the construction of the main sewers in the principal thoroughfares, by the working of a heavy steam-roller passing over them, the Directors considered they were bound to place on record their strongest protest against the introduction of what they fully believed would be a source of great danger to the public. They were not singular in this action, as it was reported in the JOURNAL OF GAS LIGHTING that The Gaslight and Coke Company were granted an injunction against the Vestry of St. George's, Hanover Square, in a similar case; the parish having to pay damages and costs to the amount of £2800. An action was also brought against the Vestry of St. Mary Abbotts, Kensington, who were condemned in costs; an appeal against the decision being dismissed with costs.† It would be impossible to put a limit to the damage which might result from a broken gas-main if it came into communication with a large sewer, wherein an explosive compound of fearful power might be concentrated. The Directors felt bound by their position to make their conviction known in this important matter, in the hope that prudence might prevail with those who had the power to decide.

Mr. LYNCH seconded the motion.

Mr. BANKS, referring to the electric light project, asked if the Company applied to the Corporation for a monopoly of the lighting of Cork.

The SECRETARY said the way in which the matter stood at present was that in the year 1889 a notice was served on the Corporation by the Irish House-to-House Electric Lighting Company, who had not a single shareholder in Ireland. The Corporation refused to give their assent. In 1890 that Company again gave notice that they would apply for a Provisional Order; but they did not do so. The result was that in 1891 the Cork Gas Consumers' Company came forward. He thought the view the Board of Trade would take of the matter was that if the people of Cork desired to have the electric light they ought to have it; and if the Corporation did not introduce it themselves, someone else should be allowed to do so.

Mr. BANKS: Then it is a monopoly you would be applying for?

The SECRETARY: I think that would be the result.

In reply to further questions from Mr. Banks,

The SECRETARY said that some of the large gas-lamps in the city had been lighted free by the Company, in order to show the Corporation what a good illuminant gas could be. The Corporation were now putting up gas-lamps of high illuminating power.

Mr. ROWE said, with reference to the steam-roller, he wished to point out that the wheels would be spread over a very large space, so that the pressure on a particular point would be less than many loads at present carried on two wheels. It was the opinion of the City Engineer that no damage would result to the gas-pipes from the roller; while it would, no doubt, be a great advantage to the city, the streets of which were at present in a very unsatisfactory condition. Steam-rollers were used in other places, and were of great benefit to the streets, while causing no injury to the gas-mains.

Mr. OGILVIE said he would like to know from Mr. Lane whether the weight of steam-rollers would be greater than that of traction-engines and other heavy vehicles of the same kind.

The SECRETARY said it was quite true that traction-engines had passed through the city at various times; and they were very objectionable. However, they only went through the middle of the street, and at long intervals. He pointed out that, formerly, several of the principal streets in Cork were branches of the river, and were now arched over. In those streets the gas-mains were very near the surface. In objecting to the steam-roller, the Directors were not speaking theoretically, but had before them the actual facts. There had been several cases in which steam-rollers had broken the mains. With reference to the argument that the wheels of the roller would be broad, and the pressure therefore distributed, he pointed out that where the streets were arched, the greater part of the weight would sometimes be thrown on one wheel.

* See JOURNAL for Oct. 20, 1891 (p. 711).

† These cases will be found reported in the volumes of the JOURNAL for 1884, 1885, and 1887.

After some further remarks, a suggestion was made that a conference should take place between the officers of the Company and those of the Corporation, with a view of some *modus vivendi* being arrived at.

Mr. BANKS thought the Directors should go before the Corporation on the electricity question, and say they did not take steps in the matter because they wished to create a monopoly for themselves, but because they thought they could produce electricity cheaper than anyone else.

The CHAIRMAN said it was open to the Directors to go again to the Corporation any time before next July. However, he thought if the Company went in for electricity at all they should have a monopoly. Mr. Banks must be aware that the demand for electricity would be very limited; and it would not pay anyone to supply it who had not plant, &c., like the Company, available.

The motion was carried.

A dividend of 8 per cent. was then declared for the half year ending Dec. 31 last; and the proceedings closed with a vote of thanks to the Chairman.

COVENTRY CORPORATION GAS SUPPLY.

The Powers of the Gas Committee.

A good deal of the time of the Coventry City Council at their last meeting was occupied in considering the following resolution, which was proposed by Mr. Lee: "That it be referred to the General Purposes Committee—(1) To consider and report whether it is desirable that the Gas Committee should submit to the Council for confirmation any, and if so what, portion of their proceedings, in addition to proceedings with respect to the following matters upon which that Committee are now required by the Standing Orders to make reports—viz.: Alterations in the price of gas; legal proceedings (as occasion may require); the borrowing of money for the purchase of lands or buildings, or the erection of new buildings or works. (2) To frame and submit to the Council with their report such alterations (if any) in the standing orders as may be necessary to carry their recommendations into effect." Mr. Lee had not much to say in support of the resolution. He believed that if the Gas Committee were privileged, they should enjoy their privileges with immunity; but then the question as to whether they should be a privileged Committee, and how far, was another question altogether. In thinking over this matter, he did not forget that in every business of importance there were certain things which should be known only to the head; and he took it that, in this Committee as in any other, the same principle ought to apply. He had been told—he had heard it said by members of the Council—that the arrangement by which the Gas Committee had power given to them was an oversight, or a mistake. He did not believe that for one moment. The Council, he was sure, were too well advised for anything of that kind to take place. But there was a feeling of irritation occasionally respecting this Committee; and he heard only the other day of a question being asked in Committee if a certain matter of business which was then being considered was to be reported to the Council, and the answer was: "No; we are not amenable to the Council; we are a Council in ourselves. We have full powers." Mr. Starley seconded the resolution; and then the Chairman of the Gas Committee (Mr. Andrews) said that he failed to see that Mr. Lee had produced a single good reason in favour of his proposition. He might remind the Council that the Gas Committee consisted of fifteen members—that was fully one-third of the Council. In other towns the Gas Committees were much smaller. At Birmingham, for instance, where there was a turnover in the Gas Department of half a million sterling, the Committee consisted of only nine members, including the Mayor. As to the powers of the Committee, he might safely say there was no oversight or mistake whatever when their duties and powers were fixed seven years ago; and they were mainly modelled on those of the Leicester Gas Committee. Mr. Wormelly said probably Mr. Andrews could explain how it was that at Leicester the question of salaries was decided in open Council. That was a slight difference which, however, might not appear of any consequence to Mr. Andrews; but it was a difference in the opinion of many people that was very important. He should support the resolution, although he did not altogether agree with the manner in which Mr. Lee had put it before them. Alderman Marriott believed that, as far as the Gas Committee were concerned, the interests of the Council were in perfectly good hands. If there was anything wrong at the gas-works, surely some one member out of the whole fifteen would come before the Council and have a complaint to make. It did not follow, in his opinion, that because the salaries of the gas managers at Leicester and Birmingham, or any other town, were discussed in open Council, that injustice was done to either those managers or to the Council of Coventry. Mr. Loudon observed that an arrangement by which the Manager (Mr. G. Winstanley) would ultimately receive £1400 a year had been brought down to £850; and he thought it was right that the Council should have some voice in settling the salaries of the head officials of the department. Mr. Worwood having expressed his intention of voting for the resolution, Alderman Dalton said he hoped the members of the Council who were in favour of this motion did not suppose there was a single member of the Gas Committee who had not the interests of the city at heart; but beyond the members of the Committee, he thought, if this motion were carried, it would be not only a reflection on, but a positive humiliation to, their excellent Gas Manager. Hitherto he (Alderman Dalton) had laboured under the impression that they had one of the best managers in England. He had never heard one single complaint against Mr. Winstanley; but he had heard many complimentary observations, and he thought that, by attempting to disturb the present arrangement, and upsetting the Committee, they were opening a door that would lead to future confusion in the Council. After further discussion of a similar nature to the foregoing, Mr. Lee wound it up by remarking that the resolution did not settle anything definitely. It merely asked the General Purposes Committee "to consider and report as to whether it is desirable." If they decided it was not desirable, he should accept their decision, and there was an end of it. The voting then took place, and the Mayor declared the resolution carried.

PROVINCIAL GAS AND WATER COMPANIES.

The following paragraphs contain some particulars as to the working of various Provincial Gas and Water Companies during the periods mentioned.

Gas Companies.

The Directors of the Canterbury Gas and Water Company, in submitting the two half-yearly statements of accounts for the year ended Dec. 31 last, congratulate the proprietors upon the continued prosperity of the undertakings. In the gas department all the plant at the works has been maintained in efficient order, and it is equal to the present requirements. It is not proposed to make any additional capital expenditure during the ensuing year, beyond a small amount which will be required to increase the size of the distributing mains in places where the demand for gas renders such a course necessary. In the water department, the Directors are glad to be able to state that a new engine, pumps, and machinery have all been most satisfactorily completed by the Resident Engineer (Mr. Buckley). Arrangements have been made to lay down an additional rising main between the pumping-station and St. Thomas's Hill reservoir in the coming summer. The amount now standing to the credit of the dividend account is £4639; and the Directors recommend that a uniform dividend at the rate of 4 per cent. be declared on the gas and water stocks, and paid free of income-tax, making, with the interim dividend, 8 per cent. for the year.

The ordinary general meeting of the Caterham and District Gas Company was held at the Guildhall Tavern on the 17th ult.—Mr. F. A. White presiding. The Directors, in their report, stated that the net profit for the past year, after the payment of interest on debentures and the temporary loan, was £1057. This, added to the balance brought forward (£642 12s. 4d.), with the interest on deposit, left £1736 available for distribution. From this the Directors recommended the payment of a dividend of 7½ per cent., free of income-tax. The Chairman, in moving the adoption of the report, said that, as compared with the two previous years, the working in the period covered by the report had been of a very satisfactory nature. There had been a larger consumption of gas, and a greater sum had been earned; and this notwithstanding the fact that the price of the Company's gas had been reduced. The cost of coal, too, had been greater than in the preceding year; if it had remained the same, they would have increased their income by upwards of £200. This, in itself, showed that the reduction in the price of gas had led to increased consumption. The sale of residuals had yielded less than last year, in consequence mainly of there not having been so large a demand for coke as formerly, although the quantity on hand at the present time was very considerable. He regretted to inform the shareholders that Mr. H. W. Smith, who had been connected with the Company for many years as Secretary and Manager, had resigned; having accepted an appointment abroad. The Board had engaged the services of Mr. G. W. Anderson to succeed Mr. Smith in the office; and he hoped that the Company would continue to progress under his management. Mr. P. H. Hall seconded the motion; and it was carried—a dividend being declared in accordance with the recommendation of the Directors. A vote of thanks to the Chairman concluded the proceedings.

The half-yearly meeting of the Derby Gas Company was held last Wednesday. Mr. H. Swingler, J.P., presided; and, in the course of his remarks, he said the Directors had expended £1395 in securing two pieces of land for the extension of their works at Litchurch, and carrying out the works recently authorized by Parliament. A sum of £5124 had also been spent on new buildings; the principal item in that amount being the settlement for the buildings and the extension of plant in Cavendish Street and renewals. There had been an increase in the sale of gas and residuals. Last year the amount spent on coal was £28,558, and the wages for carbonizing alone were £8260; and both these items showed an increase. They had drawn from the reserve fund to the extent of £2814; and as £2235 was abstracted from the same fund in June last, it had reduced it to something like £10,000, in round figures. He, however, hoped that shortly the present state of affairs would be altered, and that they would return to the condition of things which existed in 1888-89. The balance-sheet was approved and adopted. Dividends on the different stocks were then declared at the rate of 10, 7, and 5 per cent. per annum.

The annual report of the Directors of the Eckington and Mosbro' Gas Company states that, after providing for bad and doubtful debts, the profit and loss account for the past year stands at £1557; and a dividend of 8 per cent. is recommended on the original or £1 shares, and 7 per cent. on the £5 shares, £200 is added to the reserve fund, and a balance of £655 carried forward. A new two-lift telescopic gasholder, capable of containing 80,000 cubic feet of gas, has been recently erected at a cost of £2502, including the purchase of additional land.

The annual report and balance-sheet of the Elland Gas Company shows that during the year the capital account has been augmented by £930; the sum of £446 having been spent on new condensers, steam-pump, and testing apparatus, and £484 on extensions of mains. This leaves a balance to the debit of capital account of £649. The profits, including the balance brought from the previous year, amount to £4426. An interim dividend at the rate of 12 per cent. per annum was paid for the June half year, absorbing, with the prescribed dividends on the preference shares, and interest on the loan capital for the year, £2306 and leaving a balance of £2120 now available for dividend. The Directors recommend that out of this sum, after providing the prescribed dividends on the preference capital, a dividend of 12s. per share on the ordinary capital be declared for the past half year, making the dividend for the year 12 per cent. In consequence of a continued increased consumption of gas, considerable alterations and additions will have to be made to the manufacturing plant to meet next season's requirements. Consequently the Directors have under consideration the advisability of issuing 500 £10 4½ per cent. preference shares in the course of the present year.

The half-yearly report of the Directors of the Gloucester Gas Company states that the balance carried to profit and loss from the revenue account shows a falling off, compared with the corresponding period of 1890, of nearly £1900. This is mainly attributable to the increased

price paid for coal and to the large decrease in the receipts for coke, owing to the low price at which it has had to be sold. The Directors express a hope that this is only a temporary state of affairs, as they are anxious to avoid raising the price of gas. They are pleased, however, to be able to report a satisfactory advance in the revenue from the sale of gas. After deducting interest on mortgages, &c., the net profit is £2099; and the Board recommend that the usual dividends be paid, which will amount to £3484—thus leaving a deficiency of £1385 to be met from the undivided profits. The 544 "C" third series shares offered to the shareholders in August last have been taken up; and the first and second calls of £5 each per share paid. In view of the continued increased demand for gas, the Directors are advised that a further extension in the manufacturing plant is necessary. This will involve additional capital outlay, to meet which a further call of £5 per share will be made during the current half year.

In the report submitted to the proprietors of the Harrogate Gas Company, at their half-yearly meeting last Friday, the Directors congratulated them on the outcome of the past year's operations. Notwithstanding the additional cost of coal, and the presence of other adverse conditions, they were in a position to present a very satisfactory revenue account—a result attained mainly by an increased consumption of gas, an improvement in the value of residuals, and the exercise of prudent economy in every department of expenditure. The accounts presented (covering the entire year) showed a sum of £7104 available for division; and out of this the payment of the balance of the statutory dividend for the year was recommended—leaving a sum of £2488 to be carried forward. The Directors alluded with satisfaction to the appreciation by their customers of their efforts to encourage the use of the most effective and economical apparatus for the consumption of gas—whether for cooking, heating, or lighting purposes. In this connection, it may be mentioned that of the 112,673,000 cubic feet of gas made last year, 76½ millions were sold for lighting purposes, and 17½ millions (registered separately) for gas-stoves, &c.; while about 9 millions additional were estimated to have been consumed in stoves but registered as lighting gas. Allusion was made by the Directors in the report to the retirement of Mr. P. H. Wilkinson, who for 32 years discharged the duties of Secretary and Engineer of the Company, and to his election as a member of the Board. These two offices have now been divided; Mr. H. Wilkinson taking charge of the secretarial work. Reverting to the accounts, the total receipts in the past year amounted to £21,105; the expenditure to £12,580 (coals figuring for £7791). The bulk of raw material dealt with amounted to 11,261 tons; the residual products being 6807 tons of coke, 523 tons of tar, and 97½ tons of sulphate of ammonia.

The Directors of the Harwich Gas Company, in their annual report, state that there is a balance of net profit for the year of £1098. This shows an increase upon the previous year of £259, which, in the face of the continued high price of coal, is satisfactory. The total make and consumption of gas shows a slight falling off; but this is attributable to the expiration of the Company's contract with the Public Health Committee of the borough in July last, and the consequent loss of half a year's consumption by the Authority. The Directors offered to make a fresh contract with the Public Authority on very reasonable terms. But their offer was refused; and though negotiations have recently been reopened by the Authority, no agreement has been arrived at, and the streets continue to be illuminated by oil-lamps. The consumption of gas by private consumers shows the satisfactory improvement of 8 per cent. The Directors recommend the payment out of the net profits of a dividend at the rate of 7 per cent. on the original shares, and 5 per cent. on the additional shares, which will absorb the sum of £941.

At the recent half-yearly meeting of the Ossett Gas Company, the Chairman (Mr. W. Statter) stated that during the past six months there had been a considerable expenditure upon additional purifiers. New cupping had also been provided out of revenue for one of the gasholders, which was not likely to need any further repairs for twenty years to come. The works were in first-class order; and the consumption of gas had increased more than 7 per cent. in the last twelve months. He did not know of another gas company in the kingdom which could show an equal increase. The reserve fund was at the maximum amount; and, owing to the special expenditure referred to, £742 was being taken from it in order to make up the amount required for the usual dividend. Resolutions were passed declaring dividends of 10 per cent. on the "A" shares and 7 per cent. on the "B" shares.

The report of the Directors of the Pontefract Gas Company, submitted at the half-yearly meeting of the shareholders last Friday week, showed that during the year 15,255,082 cubic feet of gas had been sold at 2s. 10d. per 1000 cubic feet; realizing £2161. The amount divisible among the shareholders was stated to be £1696, £943 of which it was decided should be used in paying the maximum dividends of 10 per cent. per annum on the original shares, and 7 per cent. on the new ordinary shares—the balance being carried forward. The sale of residuals, it was also mentioned, had realized £582; and the average price paid for coals during the half year had been 11s. 11d. per ton.

The Directors of the South Shields Gas Company are able to submit to the proprietors a very good account of the working of the past year. Compared with the preceding twelve months, the results showed an improvement. In the sale of gas, there is a gross increase of 11,595,153 cubic feet; and in the rental, £5658—a large proportion of the latter being due to the increased price of 3d. per 1000 cubic feet which came into operation at the beginning of the year. (The bulk of the gas is sold at 2s. 6d., and a small quantity at 3s. 3d. per 1000 cubic feet.) The receipts from residuals show a slight decrease. A better price has been obtained for coke, at the same time there has not been such a good sale for it as during the previous twelve months. The coal cost £2520 more for the year. This is partly due to the increased quantity carbonized; but chiefly to some of the high-priced contracts, which did not terminate till well on in the year. Cheaper contracts are now in operation, and will tell in favour of the current year's revenue. The gross balance of profit for the year is £17,600, as against £14,804 for 1890. After deducting interest paid on loans, and the interim dividend, there is an available balance of £9081. This sum admits of the payment of 5½ per cent. for the past half year, which, with the 4 per cent. paid in March last, makes 9½ per cent. for the year, the full amount the proprietors are entitled to according to the present price of gas under the sliding scale; leaving a balance of £906 to be carried forward. From the accounts, we learn that the sale of gas and public lighting produced £44,131; the rental of meters, stoves, engines, and lamps, £3181; residual products, £13,777; and sundry items, £485. The total amount of the disbursements on revenue account was £43,975, of which coal absorbed £22,652. The balance of profit is £17,600.

In addressing the shareholders at the recent annual meeting of the Uxbridge and Hillingdon Gas Consumers' Company, the Chairman (Mr. W. Fassnidge) stated that, as compared with 1890, the shareholders would observe that the receipts for gas and meter-rental, residual products, &c., were less than the year previous by the small sum of £32, which was accounted for by the lowering of the price of gas by 3d. per 1000 cubic feet, from Lady-day, 1890. The quantity of gas sold and brought to charge in 1890, was 33,575,100 cubic feet; and in 1891, 34,972,000 feet—showing an increase in the consumption of 1,352,800 cubic feet. A great portion of this increase was attributable to the gas being used for trade purposes, and therefore not charged at the same price as if employed for illumination. On the expenditure side of the account, it would be seen that the gross expenditure for the year was more than for 1890. This was partly made up by the extra cost of coal, partly by the use of more cannel coal, and by the rise in wages. Turning to the profit and loss account, he said it showed that, after paying debenture interest, &c., there remained a sum of £2297; and by having recourse to the reserve fund to the extent of £300, they obtained the sum of £2597, which was sufficient to pay the statutory dividend. Referring to the question of the assessment of the works and plant, he said that it had been considerably increased, and the Directors thought it advisable to appeal against it. But he was sorry to say without any good result. He was of opinion that it would be advisable to again appeal against the assessment; and if then the Assessment Committee would not give them the relief sought for, they should take the question by way of appeal to Quarter Sessions. This matter would be brought before the Directors at their next meeting. The report and accounts were adopted.

The Directors of the Walker and Wallsend Union Gas Company report to the proprietors that the operations of the past year have proved even more favourable than in the year 1890. The accounts show that the revenue amounted to £16,109; and, after deducting the expenditure, a balance of profit remains of £4818. The Directors state that they have lost no time in proceeding with the necessary alterations and extensions mentioned in their last report. They have laid new 8-inch and 4-inch mains in Walker a distance of 1620 yards. At the Willington works, some of the old plant has been removed and replaced by a large gasholder, new pumping-house, engine-house, condenser, &c. The removals have been charged to depreciation account; and it is proposed that the amount be written off, over a period of seven years. The Directors, therefore, suggest that the amount to be deducted from profit and loss for the depreciation fund for the past year be £500. An interim dividend of 3½ per cent. for the first half year was declared in August last, less income-tax; and the Directors now recommend that a dividend be declared at the rate of 4½ per cent. for the second half, making 8 per cent. for the year.

The half-yearly meeting of the Wolverhampton Gas Company was held last Tuesday. The report and balance-sheet showed that the total receipts amounted to £35,871; and the expenditure to £29,551—leaving a profit of £6320. A dividend of 5 per cent. upon the consolidated stock and 3 per cent. on the preference shares was proposed, leaving £48 to be carried forward. Great regret was expressed by the Directors, in their report, at the death of the former Chairman (Mr. John Underhill), who had been a member of the Board for 35 years. The Chairman (Mr. H. W. Owen), in moving the adoption of the report, said he considered the balance-sheet was satisfactory. Although the cost of coal and other materials, and also the price of labour, had increased greatly, they would not be compelled to raise the price of gas. They were extending their means of production so as to meet the increased business brought by the growth in the number of customers and the more general utilization of gas for domestic purposes. Mr. Ward seconded the motion, which was carried, and the dividends as recommended were sanctioned.

Water Companies.

The shareholders of the East Worcestershire Water Company held their half-yearly meeting at Birmingham last Thursday. The Secretary (Mr. P. W. Walker) read the report of the Directors, which stated that during the half year supplies had been laid on to 171 premises, making the total on Dec. 31 last 2693. The water pumped from the Burcot Well had been, on an average, 356,924 gallons daily. Extensions of the mains had been made at a cost of £916. An agreement for the supply of Droitwich was sealed on Sept. 17 last; and contracts were entered into for the supply of the necessary mains with Messrs. Cochrane and Co., and for the main-laying with Messrs. Jones and Fitzmaurice. The work was commenced without delay; and up to the end of the year, there had been laid 5320 yards, leaving 3480 yards to complete the main to Droitwich. The cost incurred to Dec. 31 was £1772, which amount had been brought into the accounts. To provide for this and other extensions, agreements had been entered into for a loan of £4000, at 3⅜ per cent. per annum. The half-yearly accounts were also submitted to the shareholders. The profit shown was £508, which was added to the balance left from the previous six months, after payment of the dividend; making a total to credit of revenue account of £1302, which it was proposed to carry forward to next account. There had been a small increase of expenditure for the maintenance of works, and the pumping charges had also increased. The whole of the machinery, plant, and mains were in a state of efficiency. On the motion of the Chairman (Mr. C. P. Noel), the report was adopted.

The half-yearly meeting of the South Staffordshire Water Company was held last Thursday at Birmingham. In moving the adoption of the report, which was noticed in the JOURNAL for the 16th ult., the Chairman (Mr. F. James) remarked that the progress made by the undertaking during the past year had been very satisfactory, although the increase in the amount of water-rates had not been quite so large as was expected. The amount received from service laying was rather less; while the rents and interest were a little more. The engine

charges amounted to a very large sum—£4722, as against £3788; but this increase was mainly accounted for by the greater quantity of water pumped. An addition of upwards of 84 million gallons of water had been pumped from the main sources; and besides that there were something like 184 million gallons in excess re-pumped at the Wood Green and Coney Green stations. In one sense this was satisfactory; yet, notwithstanding the increased quantity of water, there was a diminished revenue from the meters. The amount due to the Company by persons for water-rates and service accounts was less than at the corresponding period—£9868, as compared with £10,220. The value of stock and materials was £2012, against £1695; and the cash at the bankers amounted to £17,830. It was out of this balance at the bank that the dividend proposed on the ordinary stock would be paid. The report stated that the cost of the new works would exhaust the amount of capital available under the Company's existing Acts of Parliament, and that it would be necessary to apply for further powers next year. Out of a total of nearly £17,000 expended on capital account in the half year, £15,000 had been spent on the new works and pumping-stations. In 1883, when first the Company went to Parliament, they asked for power to raise only £160,000; since then their powers had been increased to £950,000. Hitherto the fresh capital had been allotted to the shareholders at par, so that they had the benefit of the interest on it, or they could sell the shares at a premium. But this could not be done in the future. The report was adopted; and it was then agreed that a dividend for the half year should be declared on the preference stock at the rate of 5 per cent. per annum, on the Dudley preference stock at the rate of 4 per cent. per annum, and on the ordinary stock at the rate of 5¾ per cent., and that interest at the rate of 3 per cent. per annum be paid on the instalments of the new ordinary stock.

The annual general meeting of the Sunderland and South Shields Water Company was held last Thursday, when the accounts presented showed a balance of £35,807 available for division. This was sufficient to enable the Directors to recommend a dividend at the rate of 4½ per cent. on the ordinary and preference stocks of the Company for the half year ending Dec. 31, 1891; making, with the interim dividend paid in September last, 9 per cent. for the year; and also to pay interest at the rate of 5 per cent. per annum on the amount called up on the shares allotted on Sept. 3, 1875. The Bill which was before Parliament at the last annual meeting duly received the Royal Assent; and the Company are now empowered to raise such an amount of additional capital as will be amply sufficient to meet any demand for water which may arise for many years to come. One of the sites, however, selected by the Engineer on which to erect a pumping-station and other works did not receive the sanction of Parliament; and, in consequence, the Directors have been advised to apply for power to purchase other land suitable for the purpose.

The half-yearly general meeting of the West Surrey Water Company was held at the Chief Office, No. 38, Parliament Street, S.W., last Thursday—Mr. A. T. Simpson, M. Inst. C. E., presiding. The report of the Directors stated that the income in the six months ending Dec. 31 last was £2718, and the expenditure £1002. As compared with the corresponding period of 1891, there was an increase of £227 in the former, and a decrease of £15 in the latter. The amount available for division was £1699; and the Directors recommended the payment of a dividend at the rate of 4 per cent. per annum. After the payment of this and the dividends upon the preference shares, there would be a balance of £464. During the half year, 1203 yards of new mains were laid, and 58 new supplies connected, representing a future rental of £115 per annum. The Engineer and Manager (Mr. J. K. Hill) reported that the whole of the works were in good order. The Chairman moved the adoption of the report; and the motion was carried. Dividends at the rates of 5 and 6 per cent. per annum were declared on the preference shares, and of 4 per cent. per annum upon the ordinary shares.

The half-yearly meeting of the Woking Water and Gas Company was held at the London Offices, last Tuesday. Lieut.-Col. Galt, J.P., presided, and moved the adoption of the report and accounts, which were noticed in this column last week. He first congratulated the shareholders upon the fact that the Directors were able to recommend a dividend of 4 per cent., which was ½ per cent. in excess of any dividend previously declared. The revenue showed an addition of about £360; and if the building operations in the locality went on in the same way as hitherto, the revenue would continue to increase. Having reminded the shareholders that the Directors had purchased the Company who had power to supply water in the Farnborough and Frimley district, he said that he hoped in time the Act of Parliament they had thus obtained would become very valuable. They had entered into negotiations with the local authorities of those places, who were anxious that the Company's water should be brought into their districts; but the Directors had tried to safeguard the interests of the Company so far by not entering into any large expenditure, unless they received a guarantee of a substantial character. The inhabitants of Farnborough, through a deputation, had placed before them a list of gentlemen who had agreed to pay altogether £500 a year for water; and he had no doubt Frimley would do the same when the Company were in a position to say they would take steps to give them a supply. Their Engineers (Messrs. J. Quick and Son) had estimated that the entire cost of laying mains from Woking through Farnborough and Frimley, including the service-pipes, would be, in round figures, £20,000. The Board did not propose asking the shareholders at present for power to raise new capital; but the day he hoped would come when they would do so. It would depend in a great measure as to how much capital would be subscribed in the district; and some of the leading inhabitants said that there was no doubt they could get a large sum—say, £10,000—from the neighbourhood. Now that the Company were paying 4 per cent., there would not be so much trouble in issuing the capital as when they were paying a smaller dividend. Mr. Charles Horsley seconded the motion. A little discussion followed, in the course of which Mr. Randall asked what consideration had been made to them for the right of supplying gas in the district by the Company which had been formed for the purpose; and the Chairman informed him that they had received £500. The motion was adopted; and subsequently the dividend was declared and the retiring Directors and Auditors were re-elected.

HEYWOOD CORPORATION GAS SUPPLY.

The Growth of the Undertaking.

Last Wednesday week, the members of the Heywood Corporation, on the invitation of the Gas Committee, visited the gas-works, for the purpose of inspecting the extensive alterations and improvements which have been completed there, to enable the Committee to keep pace with the increased demand for gas, and to assist them in improving its quality. A goodly number of the members responded to the invitation. The party made a complete inspection of the additions to the plant, which have been in course of construction for many months past, and which comprise a large new gasholder, engine-house, two engines and exhausters, two boilers, and a capacious purifying-house, capable of accommodating another set of purifiers equal to those already in operation. The engine-house is a handsome little apartment in comparison with the one which formerly existed; and the old engine has been erected in another part of the works, and utilized for a different purpose. Over the engine-house is a laboratory, and adjoining is a room for the use of the stokers and workmen. The members of the Council seemed to be well satisfied with the manner in which the capital (amounting to £3000) has been expended. The company subsequently had "high tea" together, after which the Chairman of the Committee (Mr. Lawton) made a statement containing statistics in reference to the extensions, and the increase in the consumption of gas in the town since its incorporation in 1881. In that year the quantity of gas sold amounted to 51 million cubic feet; while last year it had so increased that the figures reached a total of 75 million feet, or an increase of 24 millions in the ten years. In 1886, the Gas Committee commenced to let out cooking stoves on hire. Previous to that, no gas was used in the town for domestic purposes, and very little for motive power. At the present time, however, the consumption for cooking and heating and motive power amounted to more than 3 million feet per annum, which showed that the Gas Committee of that period adopted a principle the application of which had turned out to the mutual advantage of the producers and the consumers and the ratepayers. In 1881, the capital expended on the gas-works amounted to £62,689, or an average cost of £1 4s. 4d. per 1000 cubic feet on the consumption of gas at that date. In 1891, the capital expenditure amounted to £70,744; showing an increase of £8000 on the capital account. This sum had been spent in the period dating to 1889. In that year the Gas Committee decided to close the capital account; and what alterations or additions had been completed since, had been done out of revenue. They had provided the new sulphate plant, and spent £600 upon it, out of revenue; and he hoped that a great portion of the expenditure on the new works which they had that day inspected would also be paid for in the same way, or from the reserve fund. Now, with the capital account still standing at £70,744, it only averaged 18s. 8d. per 1000 feet of gas consumed, or 5s. 8d. less than in 1881. Within the last two years, since the price of gas had been reduced, the consumption had increased by 10 million cubic feet. In 1889, 1,750,000 cubic feet was used for stoves and motive power; while in 1891 the total had reached 3 million feet. In the course of a conversation which followed, many of the members of the Council expressed their satisfaction with the statement which had been laid before them.

Gas-Engines for Electric Lighting in Theatres.—The London County Council have adopted a series of rules and regulations with regard to the electric lighting of theatres and other places of entertainment. One is that gas-engines employed in this connection are to be placed in rooms so adequately and continuously ventilated that no explosive mixture of gas can accumulate by any leakage from the engine in the event of any of the gas-cocks being left turned on. A hood, connected with a pipe carried into the external air, is to be fixed over the ignition-tube, when this is used.

New Water-Works for Marlborough.—At the recent quarterly meeting of the Marlborough Town Council, the Committee appointed to consider the advisability and probable cost, &c., of the proposed water-works for the borough reported that they had made inquiries, and obtained much valuable information; and they were led to believe that works could be provided at a cost of between £4000 and £5000. They therefore recommended the Council to construct and maintain works for the district, and that they should be empowered to employ an engineer to prepare the necessary plans, &c. They also desired permission to make application to the Local Government Board for power to borrow a sum not exceeding £6000 for the purpose. The Mayor (Mr. M. Jeans) proposed that the report and recommendations be adopted and carried into effect. After considerable discussion, Mr. Head moved, as an amendment—"That a census be taken of the town in respect to the water-works, and whether householders would take the water." This was seconded, but finally defeated by ten votes to five; and the original motion was carried by a corresponding majority.

The Liverpool Corporation and the Electric Lighting Company.—At a recent meeting of the Watch Committee of the Liverpool Town Council, a question relating to the electric lighting of the city was under consideration. The Corporation at present have power to purchase from the Liverpool Electric Supply Company the undertaking comprised in the Provisional Order of 1889 at the end of 21 years; they can also acquire the undertaking authorized by the Order of 1891 at the end of 42 years. Some time since the Company applied for the consent of the Corporation to an Order enlarging the time within which the Corporation could elect to purchase the undertaking to 42 years—that is to say, for both undertakings. The Committee decided to recommend the Council to consent to the time being extended to 40 years on condition that the Company agree to power being inserted in the Order for the Corporation to purchase as a going concern both undertakings at any time after Dec. 31, 1897, upon giving twelve months' notice to that effect. If the Corporation do not elect to purchase the undertaking under the proposed new powers, they will still be in a position to purchase the same at the expiration of 40 years without anything for the goodwill.

THE ELECTRIC LIGHTING QUESTION AT CAMBRIDGE.

At the Quarterly Meeting of the Cambridge Town Council last Thursday week, the Electric Lighting Committee reported in the following terms: "That the Town Council has received an official communication from the Local Government Board, in answer to the application of the Corporation for permission to borrow the sum of £35,000 for the purpose of electric lighting, giving the sanction of the Board to the borrowing by the Corporation of £25,840 for the above purpose. This sum is, in the opinion of the Committee, not sufficient to enable the Council to carry out the scheme proposed by Professor Garnett, so far as regards any part of the town outside of the compulsory area described in the Provisional Order. Messrs. Parsons and Co. have made a proposal to the Committee to form a Company for taking over the powers and duties of the Corporation under the Provisional Order. The Committee recommend that they be authorized to negotiate with Messrs. Parsons and Co. on the basis of their proposal, and that, failing a satisfactory arrangement with them, the Committee be at liberty to negotiate with some other firm or company for the taking over of the corporate powers." Alderman Whitmore, in proposing the adoption of the report, said he felt it would have been better if the Local Government Board had given them sufficient money to go on with the work; but they had only granted £25,840—merely the sum required to cover the prescribed area, and not sufficient to carry out Professor Garnett's views. He could not support any resolution which would confine the electric light to the prescribed area; and he thought they ought to have sufficient money, in the event of anyone outside the area requiring the light, to extend it to the whole of the town. Alderman Deck seconded the motion. Mr. Vinter said he had always opposed, and always should oppose, a grant from the rates to light any portion of the town; but he thought the advantage of the light should be within the reach of every inhabitant of the borough. He hoped, therefore, that the passing of the report did not absolutely settle the matter, and that it would be distinctly understood, if the negotiations were commenced, it would be upon the basis, at all events, of the property reverting to the Corporation upon reasonable terms and within a reasonable period. He could not help thinking that the application to the Local Government Board had been considerably "bungled." The Board only granted them a loan of £25,840, which did not admit one shilling for an alteration of plant or extension of mains. Mr. Morley said the report was not worded according to what the Committee had decided. Their idea was to ask the Company for their terms, and then bring forward two reports—one giving the cost for the Council to do the work itself, and the other the terms of the Company. He would be prepared to vote for the report if the mover would allow the following words to be added: "And bring before the Council two schemes—first, for the Corporation lighting the prescribed area itself; and, second, the offer of any company." Mr. Flack proposed, as an amendment, that the report should be referred back to the Committee; and Mr. Huddleston seconded—the latter gentleman remarking that he trusted the report would go back to them with an understanding that as a company was to have the risk, it should have the profits also. It was not to be supposed that any company would accept a contract for only seven years. Several members expressed the opinion that there was no reason for the report being referred back; and the amendment was afterwards defeated, and the report adopted.

St. Helens Corporation Water-Works.—The Local Government Board have written to the Town Clerk of St. Helens (Mr. W. J. Jeeves) sanctioning the borrowing of £2100 for water supply purposes. The works contemplated are the construction of a new 6-inch main from the Sutton pumping-station to the Brownedge large reservoir, and also the enlargement of the supply-pipes from the reservoir to the borough; the present pipes being insufficient.

Birmingham Electric Supply Company.—The ordinary general meeting of this Company was held a few days ago. The report of the Directors stated that the accounts upon which the document was based were only for a period of nine months, which was in consequence of the alteration of the date of the closing of the financial year. The accounts for that period showed a profit of £714, which, after taking into consideration the fact that the period over which the accounts extended included the six summer months, the result was deemed satisfactory. Of the profits, £352 had been applied to the depreciation reserve account; and the Directors recommended that the balance be carried forward to next year's account. The demand for the light had been most satisfactory; and from the very ready way in which it had been taken up, the Directors fully anticipated a large increase in the output of the station, to supply which they proposed putting down further plant.

Railway Carriage Lighting.—The Right Hon. John Young, Chairman of the Northern Counties (Ireland) Railway, at the half-yearly meeting of the shareholders on the 12th ult., referred in his speech to the change which was being wrought in the system of lighting their passenger carriages. It was, he said, a change from oil to gas; and gas had been chosen, after careful consideration and inquiry, as being the best illuminant at present known for this particular purpose. Again, at the recent half-yearly meeting of the Great Northern Railway Company, the Chairman (Lord Colville of Culross) said they were abolishing oil-lamps as fast as they could, and substituting oil gas at a cost, which might appear extravagant, of £100,000. They had had to build gas-works in London, Doncaster, and Leeds, and to alter the fittings. But it would be an economy in the end, as they would get rid of all that lamp-cleaning and so on, which not only cost a good deal of money, but occupied a vast amount of time. The Directors had not taken this course without having well considered it. Electricity had been recommended; and they had tried it, but they had not much faith in it for railway purposes. It was, no doubt, a very good light if it could be trusted. But in oil gas they had full confidence; and, though it cost a great deal of money to supply, he was sure that in the end it would be beneficial and economical to the Company.

METROPOLIS WATER SUPPLY.

The London Water Question and the Birmingham Water Scheme.

In view of the suggestion contained in the report of the Select Committee of last session on the Metropolitan Water Bills, that Parliament should consider, before granting any powers for further encroachment upon the possible fresh areas of supply, "how far provision ought fairly to be made for the possible requirements alike of the Metropolis and of the other large populations upon the lines of supply," an opinion has prevailed that the scheme of the Birmingham Corporation for conveying water to the Midlands from Wales should not receive legislative sanction until the Royal Commission which has been promised to inquire into the question of the water supply of London has completed its labours. As the result of this feeling, a conference of gentlemen interested in the question was held on Monday last week, by invitation of Sir J. Lubbock, Bart., M.P., at the offices of the London County Council, to consider what action should be taken in the interests of the Metropolis. The gathering was essentially a representative one; amongst those present, in addition to members of Parliament for London and suburban constituencies, being members of the London County Council and the Corporation of the City of London, and representatives of the home counties immediately affected. The meeting was private; but the London Correspondent of the *Birmingham Daily Post* forwarded to that paper the following account of what transpired: "After Sir John Lubbock had explained the object of the meeting, a discussion took place as to how the Birmingham Bill should be met; and it was proposed that the measure should be postponed for a month, pending the consideration of the London Water Question by the promised Royal Commission. This was opposed by Sir Guyer Hunter, an authority on the subject, who took a leading part in the inquiry held in 1890 by the Corporation of London, and who is not only, I believe, generally in favour of the Birmingham Bill, but is of opinion that such an investigation as that by a Royal Commission would occupy at least 18 months. It was argued in the course of the discussion, which throughout, I am told, showed no spirit of antagonism towards Birmingham, that your city, upon the admission of Sir Thomas Martineau, was not in immediate need of the proposed additional supply, but wanted to be ahead of London in the matter of going to Wales for water; and that as the capital would certainly want a large extra amount before ten years have passed, it would be adverse to her interests to allow the Welsh watershed to be absorbed by Birmingham. One of the members present, who is also a Director of a Water Company, seemed to suspect that the anxiety of the London Council for a second supply was in order to affect the price at which it hopes ultimately to buy up the Companies; while it was asked by another why, if the matter were so urgent, the Companies themselves did not oppose the Birmingham Bill. The general feeling, however, was that it would be well for London and Birmingham to come to an understanding on the point, and that no further step should be taken in regard to acquiring the Welsh watershed until the proposed Royal Commission, with its reference so broadened as to include (in accordance with the Select Committee's recommendation) an inquiry into the possible requirements of all the large populations upon the lines of supply, had made its report. Ultimately it was proposed by Mr. S. Buxton, seconded by Mr. Bristowe, and carried unanimously, that a Committee, including Sir John Lubbock, Mr. Buxton, Mr. Bristowe, Mr. Dixon-Hartland, Lord Compton, Mr. Murdoch, and Mr. H. L. Lawson, should be appointed to confer with the members for Birmingham and the representatives of your Corporation as to the postponement of the next stage of the measure. The Metropolitan members are all agreed that, although they do not desire to move its rejection at this point, the question is one of national, rather than of local, importance, and ought to be thoroughly and impartially examined before being decided upon. If the postponement asked for is not granted, therefore, strong opposition may be looked for. I may add that Mr. Richard Chamberlain, who was present at the conference as a Metropolitan member, was invited to join the Committee, but declined, on the ground of his old connection with Birmingham. As to the Royal Commission itself, it can be said that it will be a small one, composed of experts, that it will very shortly be gazetted, and that it is expected to report within the year."

At the meeting of the London County Council on the following day, Sir J. Lubbock explained that since the last meeting—in fact, on the previous Friday morning—it had come to their knowledge that the Birmingham Corporation had put down their Water Bill for second reading as for Monday (the 22nd ult.). The Council would remember that they passed a resolution agreeing to petition against the Bill; but he was not quite sure whether the Council would like to oppose the second reading. At the same time, having regard to the importance of the question, he thought that he ought not to allow the second reading of the Bill to pass unquestioned. Under these circumstances, he took upon himself to summon a meeting of members of Parliament representing the Metropolitan and home county constituencies and representatives of the County Councils interested—a course which the Chairmen of the Water and Parliamentary Committees had approved. He also saw Mr. Chamberlain, who courteously agreed to postpone the Bill for a week. A conference was held on the previous day, at which a general opinion was expressed that, after the representation of the House of Commons Committee of last year, it was undesirable that any other areas should be appropriated until the Royal Commission had reported on the whole subject. At the same time, being anxious to meet the views of Birmingham, if possible, a Committee was appointed to confer with the representatives of that city, and see whether any satisfactory arrangement could be arrived at. The Committee included Mr. Lawson, Lord Compton, Mr. Buxton, Mr. Bristowe, Mr. Murdoch, Dr. Evans, and Mr. Dixon-Hartland. In issuing invitations to the conference, he was actuated by the desire to act with the Metropolitan and home county members; and he hoped that he had acted in accordance with the wishes of the Council.

As the outcome of the proceedings above recorded, a conference took place last Thursday at the House of Commons between the Committee representing Metropolitan interests and the members for

Birmingham, who were accompanied by the Mayor (Mr. Lawley Parker), the Chairman of the Water Committee of the Corporation (Sir T. Martineau), and the Town Clerk (Mr. E. Orford Smith). The subject for consideration was introduced by Sir J. Lubbock, who stated, in the first place, that he wished to disclaim the slightest feeling of hostility towards Birmingham; but that, having regard to the report of the Select Committee of the House of Commons last session, he thought it was his duty to take the opinion of the Metropolitan members of Parliament before the Birmingham Bill was read a second time. He had communicated with Mr. Chamberlain, and had been met in the most friendly manner; and, as a result, the second reading of the Bill had been postponed for a week, to enable the conference to be held. He wished to know whether the position of Birmingham as regards its Water Bill was urgent, or whether it would not be possible to delay the application to Parliament until the proposed Royal Commission had reported. Other Metropolitan members having asked a similar question, Mr. J. Chamberlain replied that, in answer to Sir J. Lubbock's inquiry, he must inform him that the wants of Birmingham were pressing, and that a very serious responsibility would rest upon the authorities of the town if they allowed any delay in promoting the Bill that had been so carefully considered, and had occupied so long a period of their time. As to the precise extent of land in Wales proposed to be taken by Birmingham, he pointed out that the area of the watershed suggested to be taken only extended to 70 square miles, while in the immediate locality there were watersheds extending for 700 square miles that would be still available for London. He strongly urged that it was essential for the compulsory supply of water to Birmingham by gravitation that the reservoir site should be at an elevation of something like 800 feet above the sea; and that the Elan district was the most suitable. On the other hand, owing to its lower elevation, London could be supplied from a level of 450 to 500 feet. Thus, while the whole district was available for the supply of London, only a part—namely, that which had been scheduled—was suitable for Birmingham. It was also pointed out that the quantity of water to be obtained from the 70 square miles scheduled on the Elan would only afford sufficient water for Birmingham and the towns *en route*, and would be quite insufficient in itself for the greater population of London; but that from the 700 miles of watershed left untouched by Birmingham, a population of 20 million might be adequately supplied. The result of the discussion was that the representatives of London asked for a short delay, in order to enable them to report; and on this ground, and on the understanding that it would not in any way imperil the prospects of the Bill as regards the time at which it would come before a Committee of the House of Commons, Mr. Chamberlain consented to a postponement of the second reading for one week—viz., to Tuesday, the 8th of March. The conference was throughout of a very friendly character; and it was generally felt that considerable information had been obtained, and that the meeting had been of advantage. After the Birmingham deputation had retired, the London Committee considered their position in the light of the promoters' explanation; and there being an evident disposition to accept this as satisfactory, it was agreed that Sir J. Lubbock should convene another representative meeting to receive the Committee's report. It was decided to draft clauses (1) empowering the promoters of any future scheme for the benefit of the Metropolis to cross the aqueducts erected by the Corporation of Birmingham, and (2) providing that any arrangements for compensation shall be fair to London as well as to Birmingham; also to recommend the abandonment of any idea of opposing the Bill in the event of this compromise being accepted. It was arranged that the general meeting should be held on the following Monday (yesterday).

Gas Exhibition at Blackpool.—An exhibition of gas appliances was held at the Station Coffee Palace, Blackpool, during the whole of the past week. Mr. J. Bickerstaffe performed the opening ceremony, in the unavoidable absence of the Mayor (Mr. H. Buckley); and in the course of his remarks, he referred to the great usefulness of gas-stoves for cooking purposes. Messrs. Richmond and Co., Limited, of Warrington and London, were the makers and exhibitors of the appliances shown. Practical lectures on cookery were given by Miss Golding.

Increased Storeage for the Southend Gas Company.—Our readers may remember that this Company, owing to the increase in the population of Southend, are applying to Parliament for a Special Act to enable them to increase their share capital, to adopt the sliding scale, and other purposes. In order to make their works equal to the additional demands upon them, the Company are at present erecting a holder to contain about 400,000 cubic feet of gas. Messrs. J. and H. Robus are constructing the tank, which is of brick and puddle, and Messrs. S. Cutler and Sons have the contract for the holder. The work is being carried out from designs prepared by the Company's Engineer and Manager, Mr. Frank Clark.

The Supply of Hydraulic Power.—The report of the Directors of the General Hydraulic Power Company, Limited, made up to Dec. 31, 1891, states that the working for the year has resulted in a gross receipt for power of £41,724, as against £34,377 in 1890. After providing for interest on debentures, Directors' and Auditors' fees, and setting aside £2467 for depreciation, the available balance is £21,113, including £1424 brought forward. The Directors propose that out of this sum a dividend of 3½ per cent. be paid for the six months ending Dec. 31 last; making, with the interim dividend paid in August, 5¾ per cent. for the year. The amount to be carried forward will be £618. While the revenue shows a satisfactory growth during the past year, there has been a very heavy addition to the working expenses; partly owing to the increased assessment of the Company's property at the quinquennial valuation. The Directors appealed against this assessment in the City of London, but without success. The increased charge on this head amounts to about £1300. Another cause of increase has, of course, been the high price of coal during the greater part of the year.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The Inland Revenue authorities at Somerset House have taken the same view of the question of assessing for income-tax upon the law and parliamentary expenses of gas-supplying bodies as was done by the Income-Tax Commissioners for the Edinburgh district. The subject (mentioned in these "Notes" on Jan. 26 last) was raised by the Edinburgh and Leith Gas Commission, who appealed against the imposition of the assessment, which in their case meant a payment of £70 for the year involved. The local Tax Commissioners decided that such charges were not taxable. Before determining whether appeal should be taken to the Court of Session, the opinion of the heads of the Inland Revenue Department in London was taken. Intimation has now been made to the Department in Edinburgh, and through them to the Gas Commissioners, that no further action will be taken. This is a fortunate decision for gas undertakings; and it should be taken note of by all.

Two matters concerning the gas supply, of considerable interest locally, have been brought before the communities of Edinburgh and Leith this week. The first had reference to the question of the lighting of common stairs, regarding which there have all along been complaints of annoyance and inconvenience. The Magistrates enforce the lighting of all such stairs by gas from dusk till 11 p.m.; and they require the proprietors to fit up the lamps and to provide a supply of gas—the occupier being held responsible for the lighting and extinguishing of the lights. Where the rent of a dwelling-house is £10 a year and over, the proprietor may recover from the occupier the amount he pays for gas; where it is under £10, he adds it to the rent. In the event of a stair-light being burned longer than the time paid for, the Gas Commissioners have two ways of proceeding open to them—either to sue the offending parties in the Civil Court for the value of the excess consumption, or to cut off the supply. The former course is, for various reasons, impracticable; and the Commissioners fall back upon the latter. In this way, at the end of the past week over 700 lights were cut off. One result is a furious newspaper correspondence, in which the Gas Commissioners are being called anything but gentlemen; and another is that notice of motion has been given in the Town Council for an inquiry into whether the Corporation should not take over the whole duties of lighting and extinguishing stair-lights, as is done in other towns. To hand the work over to the Corporation would mean, if the cost of lighting and extinguishing were taken out of the rates, an addition of nearly ½d. to the police assessment. This would be resented by people who do not live in common-stair tenements; and to throw the extra cost upon those whose premises are lighted, would nearly double the present charge. Judging by the ferment which has been created in Edinburgh by the action of the Gas Commissioners, it is a subject which very closely touches the community. It therefore deserves the best consideration that can be given to it, in order that drawbacks to the sale of gas, arising out of the inconvenience inflicted upon a large section of the populace by the present system, may be removed.

The other matter has reference to internal administration, and is not a very pleasant one. In February, 1889, the Gas Commissioners appointed Mr. Wm. Bauchope superintendent of the surveyors. Mr. Kinloch Anderson at that time objected to the appointment, on the ground that it meant the superseding of 32 men, some of whom had served many years in the department, by one who had been employed as a collector by the Edinburgh Gas Company for only 15 months. Bailie Walcot supported the appointment, and assured the Commissioners that "not only would he (Mr. Bauchope) prove himself an efficient man, but that the Commission would be very free to acknowledge the efficiency afterwards." The appointment was only made by the casting vote of the Chairman. Whatever may have been Mr. Bauchope's efficiency outsiders cannot say; but yesterday the Works Committee were called together specially to consider a series of complaints by Mr. Cockburn, the collector, regarding the manner in which Mr. Bauchope has done his work. These had reference to alleged neglect in the reading of meters and other matters, by reason of which the collector's staff had been brought into conflict with the public. A Sub-Committee which had considered the complaints, recommended that the surveyors' department should be placed under the collector; but the Works Committee did not accept the proposal. They have agreed to recommend rather that Mr. Bauchope should be admonished, and the surveyors who had been remiss in their duties censured; also that consideration of the subject should be postponed till January next, by which time it will be seen whether any improvement in the working of the department has been effected. The subject comes before the Commission on Monday.

Since this day week, I have managed to do a little "interviewing" in respect of members of the deputation of whom I spoke in my last budget of "Notes" as having gone to London to learn if there was any good, solid information that might be relied on in regard to the lighting of the public thoroughfares of the Metropolis by electricity. So far as concerns their inquiries regarding the cost of the lighting, the deputationists seem to have come back to Glasgow without being made very much wiser; and they have been led to understand that they must wait until a financial and working year of the street lighting has been completed before they can get exact and trustworthy data as to the actual or very probable cost. I am told that no person in the Metropolis who was spoken to on the subject appeared to have any reliable knowledge as to the amount of gas that was being superseded in those leading thoroughfares in which electric lighting has been adopted on the understanding that it "has come to stay." From this absence of reliable information on such vital points, it is evident that the resolution which was recently passed agreeing to light a number of the principal streets in the centre of the city by means of electricity cannot fail to be a sort of "leap in the dark." In respect of the supply stations, however, it is said that in one or two cases much was seen that was worthy of admiration, and even of imitation; and some very valuable data have either been obtained or have been promised. It will be some months yet before street lighting in Glasgow by electricity will be possible; but there

are indications of some progress being made. Professor A. B. W. Kennedy, F.R.S., who is the chief adviser to the Glasgow Corporation Sub-Committee on Electric Lighting, was seen in London by some members of the deputation; and I understand that his drawings and specifications for the boilers, engines, dynamos, steam piping, &c., required for the new central station which is to be erected for the Corporation in Waterloo Street, Glasgow, have been handed over to the Committee and their local experts, who have been authorized to adjust the specifications, and advertise for tenders for providing and fitting up the machinery and electrical and other plant. When that central station has been erected, it will be rendered available alike for street lighting and for the large demands which are expected from private consumers. From what some of the members of the deputation have seen and heard in London in regard to electric lighting, they are big with hope as to the extent of the local demands upon the new station. Nothing has been said yet as to whether or not the Board of Trade unit is still to be charged at 8d.; but I certainly do anticipate that if the price per unit is materially lowered, the consumption of electrical current will become very great, with the almost inevitable result that the supply of gas will no longer increase by the "leaps and bounds" that have hitherto been known in connection with the Glasgow Corporation gas-supply undertaking. All the same, the indebtedness of the Gas Trust will remain; and the annuitants will continue to look for their annual dividends.

Up to the present, the income for gas-rental in Glasgow and its suburbs shows a great increase over so much of the financial year as has now gone. When the Treasurer reported his revenue a few days ago, he was able to say that he had collected almost £227,000 since the beginning of the financial year, as compared with rather over £189,500 at the corresponding time last year—the increase shown being practically £35,400. The increase in the revenue from the sale of residual products is not on the same grand scale.

Mr. M'Crae, of Dundee, has submitted a statement to the Works Committee of the Gas Commission, specifying a number of things which he suggests are necessary to be done at the gas-works, in consequence of the ever-increasing demand for gas in Dundee. These include a prospective addition to the retort power of the works; the construction of a cooling-main to the condensers; the provision of two exhausters of 100,000 cubic feet capacity per hour, to take the place of two of antiquated type; enlarged station meters; the repair of two gasholders; and the extension of the chemical works apparatus. Some of the works suggested are not urgent. The Committee are to meet on an early day to consider Mr. M'Crae's statement.

The Aberdeen Corporation are under the necessity, in consequence of the recent extension of the city boundaries, as well as of the increased demand for gas within the city, of facing an expenditure of over £100,000 upon the extension of their gas-works. Bailie M'Kenzie, the Convener, brought the subject before the Works Committee on Monday. He stated that the space available for retort extension would all be utilized within, at the outside, three years; and that they would then have to find room for an extension of the retort-house. They would also require a great enlargement of their gasholder accommodation without any delay; because at present they had not storeage for one day's consumption in winter. Last year, ground was purchased at Gallowhill upon which to erect gasholders. Then their workshops and offices were in a dilapidated condition, and would require to be rebuilt. These, with the outlay upon new mains in the extended district, would entail the expenditure of the sum above mentioned. As their borrowing powers are nearly exhausted—the Corporation are within £11,000 of their limit—it would be necessary to go to Parliament pretty soon to get additional borrowing powers. A Sub-Committee was appointed to consider and report on the subject. The capital account of the gas-works at present is £129,776.

In consideration of the fact that Mr. James Fleming (who was promoted to the post of Treasurer to the Glasgow Gas Trust about three years ago) has had considerable additional responsibility put upon his shoulders during the past year, by the acquisition of three fresh gas-supply undertakings, and by the additional work which will fall to his lot in connection with the local electric light undertaking, on and after March 1, it is not unlikely that a material increase will shortly be made to his salary; indeed, I am told that there is a recommendation from the Finance Sub-Committee for an increase to be laid before the Town Council at the next meeting of that body. Mr. Fleming is certainly a very worthy man, as also a most efficient and painstaking public servant; and he has become quite a favourite with the gentlemen of the Committee whom he has specially to serve.

The great decline in the price of residuals is likely to have a very serious effect upon the contractors who take these commodities from gas-works. I have already mentioned the difficulties into which the Glasgow Alum and Ammonia Company have fallen. In the Court of Session to-day, answers were lodged to both of the petitions relating to that Company which were presented last week. The Company state that the petition of the Barrhead Gas Company is unnecessary; and that at the meeting at which it was resolved to go into liquidation, the Barrhead Company, whose debt they say is £277, were the only dissentients out of creditors representing £8553. A statement of the affairs of the Company, which was submitted at the meeting, showed the liabilities to be £11,136, and the assets, £8014; and they maintain that the value of their stocks very largely depends upon their being sold as part of a going business. The Barrhead Company, replying to the petition of the Alum and Ammonia Company, state their claim at £350, for £140 of which they hold an extracted decree. They consent to the winding up being under the supervision of the Court; but suggest that Mr. John Gourlay, C.A., Glasgow, should be appointed joint liquidator with Mr. Thomas M'Lintock, C.A., Glasgow, in place of Mr. Thomas Robinson. The petitions and answers were sent to the roll for discussion. It is announced this afternoon that Mr. John Dobbie, chemical manufacturer, of Leith, has issued a circular to his creditors intimating that he is unable to meet his engagements. Mr. Dobbie's firm of John Dobbie, Sons, and Co., is a well-known one in the residuals world. They hold, among others, a contract with the Arbroath Gas Corporation for five years, from May, 1889, at the rate of 6s. per 100 gallons. The firm own a chemical works at Elliot, four miles from Arbroath, as well as at Leith.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 27.

Sulphate of Ammonia.—There is no change as far as prices are concerned; but there seems rather more inclination to buy on the part of consumers, and with milder and brighter weather it would not be surprising to see considerable movement very soon. This is not simply a figure of speech; for it must be palpable that when parcels are taken off the market readily, and the shipments are fully up to the mark (over 20,000 tons this year up to date), that the production of sulphate is being consumed—it being immaterial in which manner or by whom consumers are being supplied. The largest portion of the deliveries has since the beginning of the year been absorbed by the dealers; and assuming that they have also their sales for March delivery to cover in, the simultaneous competition from consumers, to complete spring requirements, this is likely to put the market on a different basis to what it is at present. Sulphate still remains considerably the cheapest commodity of nitrogenous fertilizers.

LONDON, *Feb.* 27.

Tar Products.—A very considerable fall has taken place in the value of tar; tar distillers having wakened up to the fact that the immediate future of tar products is of a most discouraging character. The firmness which characterized benzol a few weeks ago has entirely disappeared; and the article may be said now to be "going a-begging." There seems to be no sale for common oils; and stocks in makers' hands are troublesome. There is no inquiry for anthracene; and the little spurt in carbolic seems to have died out. Pitch is the only article for which there is any demand; and it is being shipped very largely. Buyers seem disposed to book contracts forward at a shade below to-day's value. Several important contracts for tar have been made at prices ranging from 15s. to 19s. The average prices for the week are: Tar, 17s. 6d. Pitch, 32s. Benzol (nominal), 2s. 6d. for 90's; 50's, 1s. 9d. Toluol, 1s. 5d. Solvent naphtha, 1s. 3d. Crude benzol naphtha, 30 per cent., 1s. Creosote, 1d. Naphthalene salts, 25s.; pressed, 45s. Carbolic acid, crude 60's, 1s. 1½d.; 70's, 1s. 4½d.; crystals, 5d. Cresol, 8½d. Anthracene (30 per cent.), "A" quality (nominal), 1s.; "B," 8d.

Sulphate of Ammonia.—Transactions have been noted in this market during the week as low as £10. This is exceptionally low; but the average business done during the week will not exceed £10 5s., less 3½ per cent. There seems to be no demand; and stocks are seriously accumulating. It is most remarkable that sulphate continues so flat, whilst nitrate of soda is decidedly firm, with a nitrogen value very much below that of sulphate. Gas liquor (10-oz.) sells at 6s. to 7s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—That there will be some more or less general stoppage of the collieries as the result of the resolution passed at the recent Miners' National Conference in Manchester, would seem to be quite inevitable, as the notices to cease work on March 12 have now all been sent in, and no further conference of the Miners' Federation will be held until after these notices have expired. It is, however, still open to question whether the cessation of work will be of any protracted character; and certainly it will not be participated in by one or two important districts. Notwithstanding this, there has necessarily been a gradually-increasing pressure of demand on the part of merchants and consumers to get in extra supplies, to carry them over any stoppage of the pits. For house-fire coals, there has been a very brisk inquiry; and in some instances prices have been slightly advanced; but practically quotations, although very firm, remain at about 12s. 6d. for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and second qualities of Arley, and 9s. to 9s. 6d. for common house-fire coals. The lower qualities of round coal continue in not more than moderate request for general purposes; and in the present unsatisfactory state of trade, it is more than probable that many works will be closed rather than submit to any appreciable advance in prices, or any difficulty in getting supplies. At the pit's mouth, steam and forge coals do not average more than 8s. to 8s. 6d. per ton; and for shipment steam coal can be readily bought at 10s. to 10s. 3d. per ton delivered at the ports on the Mersey. All descriptions of engine fuel have been in considerably increased request, and this has necessarily given a hardening tendency to prices, which, in a great many cases, have stiffened up quite 3d. to 6d. per ton upon recent minimum quotations. At the pit's mouth, burgy averages 6s. 3d. to 6s. 9d.; best slack, 5s. 3d. to 5s. 9d.; medium, 4s. 3d. to 4s. 9d.; and common, about 3s. 9d. to 4s. 3d. per ton.

Northern Coal Trade.—There has been a better demand for certain kinds of coal during the past few days; because of the fears of a stoppage, to some extent, of collieries. In consequence of this, many large users are stocking coal; and this has in some degree counterbalanced the effect of the strike of the engineers, which has thrown much coal on the market. Best Northumbrian coal has been in fair demand, there being no fear of an interruption of its supply. The price is steady at from 9s. 9d. to 10s. per ton, according to place of shipment. Small steam coals are more abundant at 3s. 3d. to 3s. 6d. per ton, also f.o.b. Gas coals are firmer, though some contracts have been concluded at very low prices. For single cargoes and for prompt delivery about 8s. 6d. to 8s. 9d. is now the prevailing price; and should there be a growth of the demand to the extent expected, a further rise in the price seems certain. The home demand for gas coals is, however, decreasing; but the exports must be expected to be larger as the spring draws on. A large contract for Rotterdam is near conclusion; and it is expected that low prices will prevail. Bunker coals are extremely dull; the prices varying from 7s. 3d. to 8s. 9d. for unscreened qualities, and up to 11s. per ton for screened. Manufacturing coal is flat—the strikes lessening the consumption. Household coal is also very quiet. In coke there is little movement; the price for best blast-furnace kinds being about 16s. f.o.b. in the Tyne—a lower price ruling at West Hartlepool. Gas coke is dull, though the output is now less.

West of Scotland.—The coal trade in this district is reported quiet. There is some forward business offering; but the rates are considered

too unremunerative to be accepted, and any exporting at all is in working off old contracts. In steam coal there is a fair business doing, and the price is very steady. The quotations are: Main, 7s. 9d.; ell, 8s. 6d.; splint, 8s. 9d. to 9s.; and steam, 10s. 3d. to 10s. 6d.—all for best sorts f.o.b. Glasgow. The shipments of Scotch coal from all parts amounted last week to 98,415 tons—a falling off of 10,520 tons as compared with the previous week; while as against the corresponding week last year there was a decrease of 11,926 tons.

Gas Cooking in Infirmaries.—The Davis Gas-Stove Company, Limited, have just fitted up a large gas apparatus for the Guardians of the Poor of St. Leonards, Shoreditch, at the Infirmary in Hoxton Street, N.

Proposed Extension of the Rainhill Gas and Water Works.—The Directors of the Rainhill Gas and Water Company have decided to extend their works, and have called in Mr. J. W. Buckley, Engineer and Manager of the Formby Gas Company, to examine and report upon the plant, and advise them generally on the matter.

Bristol Gas Company.—At the half-yearly general meeting of this Company, held last Friday, the report and accounts, which were noticed in the JOURNAL last week (p. 350), were adopted, and the dividend recommended—at the rate of 5 per cent.—was declared. Sanction was given to the Bill now being promoted by the Company to enable them to extend their works. A report of the proceedings will appear next week.

Sale of Stock in the Cambridge Gas and Water Companies.—Last Tuesday, Mr. J. C. Jonas submitted for public competition £410 of original stock of the Cambridge Water Company, which realized at the rate of £270 4s. 10d. per cent., and £674 of 10 per cent. consolidated stock, which was knocked down at £256 per cent. On the same occasion, he put up £234 of 10 per cent. stock of the Cambridge Gas Company, for which an average price of £218 16s. per cent. was paid; also £210 of 7 per cent., which realized an average of £142 17s. 1d. per cent.

Yorkshire Water Gas Company.—An extraordinary general meeting of the Yorkshire Water Gas Company, Limited, was held last Thursday at Leeds. Mr. J. Mitchell presided; and, in opening the proceedings, he explained that some of the shareholders seemed to fear that their Articles of Association did not enable them to legally enter into contracts for work in Lancashire. The Directors were advised that they did; but it had been deemed expedient to make their position perfectly clear, and he therefore proposed—"That the Memorandum of Association of the Company be altered, by inserting after clause 3 (*a*) of the present Memorandum of Association the following clause: (*a a*) 'To acquire and to exercise and enjoy the right to use and vend within the county of Lancaster, and to grant licences for the using and vending within the said county of Lancaster, of all or any of the inventions herein mentioned or referred to.'" Mr. A. S. Kirk seconded the resolution, which was adopted unanimously. The Chairman then moved that the name of the Company be changed to the Yorkshire and Lancashire Water Gas Company, Limited. Mr. Whitehead seconded the proposal, which was carried.

Tottenham and Edmonton Gas Company.—The half-yearly meeting of this Company was held last Saturday. The chair was occupied by Mr. Corbet Woodall, who, in the course of his remarks, expressed the regret of the Directors that their Chairman (Mr. G. Gripper) was unable, through illness, to preside over them that day. Commenting upon the report and accounts (which were noticed in the JOURNAL last week), he said he felt that the figures were eminently satisfactory, and such as they might well congratulate themselves upon. He thought it was a matter of great satisfaction to them all that they had been able to tide over the past two or three years without either raising the price of gas, reducing the dividend, or taking a penny from the invested reserve fund. Since Christmas, 1888, they had only once managed to earn their dividend; and each half year they had had to withdraw something from the undivided profits to pay the dividends, but the reserve fund had not been touched. He moved the adoption of the report; and Sir H. Cartwright seconded. After a short discussion, the motion was carried. Dividends at the rate of 11½ per cent. per annum on the "A" stock, and 8½ per cent. on the "B" and "C" stocks, were declared. A resolution was also passed expressing sympathy with Mr. Gripper in his illness, and hoping that he would speedily be restored to health; and afterwards the services of the Directors and officials were acknowledged. A full report of the proceedings will be given in our next issue.

A New Coast Light.—A new beacon or coast light, the invention of Professor Schirm, of Berlin, has just been tested by the German Navigation Society, of Hamburg, with eminently satisfactory results. According to *Iron*, the experiments were conducted on the coast near the mouth of the Elbe, where the new method of illumination is said to have literally put the electric lighthouses in the shade; and as the cost of the light is stated to be insignificant, the experts present had no hesitation in prophesying a successful career for the invention. The apparatus, with all the accessories, is barely 7 feet high, and is about 3 feet in diameter. In the interior of the apparatus which is best adapted for giving an intermittent light) there is a blast-engine, by which benzene gas is produced; while air is driven through pumice-stone strongly impregnated with benzene. The benzene gas is carried through very fine magnesium powder, and, saturated therewith, proceeds upwards through a pipe, and is consumed in a small flame, yielding a light of 400,000-candle power. The apparatus is controlled by clockwork, and is enclosed by glass, with a view to protection from wind and weather. The consumption of magnesium is very small; varying, according to the power of the light required, from 4 to 10 centigrammes of magnesium powder per flash. The consumption in an hour would therefore amount to from 14·4 to 36 grammes of the powder, equal for a 10-hour working, to from 144 to 360 grammes, which would cost about 6s. and 13s. respectively. Professor Schirm has, of course, patented his invention; and as a proof of its value, he quotes the fact that the London Trinity House has purchased the apparatus, with the object of testing its capabilities at a provisionary beacon station at Folkestone.

Gas, Water, and General Investment Trust, Limited.—The fourth general meeting of this Company was held last Friday, at Winchester House, E.C., under the presidency of Mr. T. Salt, M.P. In moving the adoption of the report, which was noticed in the JOURNAL last week, the Chairman said the past year had been a difficult and anxious one; but they had been able to hold their own, to offer the same dividend as on the previous occasion, and to increase the reserve fund from £50,642 to £64,341. Their investments had risen since the beginning of 1891 from £810,000 to £855,000; and they had a new item in advances on loans amounting to £26,687, which represented satisfactory business when good advances could be made. The balance carried forward in 1891 was £2539, while now the amount was £1321. The average of their investments was £4800, compared with £5600 a year ago; and they endeavoured to spread them as much as possible. They were steadily reducing their holdings where uncalled capital existed. They occasionally borrowed from their bankers; but they only used them for the sake of convenience. At the present time they owed their bankers nothing. The Directors suggested that an issue of debenture stock should be made to the amount of £50,000 at the price of 101 per cent. When this was done, the share capital would be very nearly double the amount of the debenture stock. He did not like to say much about the prospects of the undertaking in such times as the present; but he thought he might venture to state that they were as satisfactory as could be expected. He concluded by also moving the payment of the dividends recommended for the half year—viz., at the rate of 4½ per cent. per annum on the preferred stock and 10 per cent. per annum on the deferred stock; making the distribution on the latter 7½ per cent. for the year. Mr. J. Boustead seconded the motion. In reply to questions, the Chairman stated that the Directors had provided for any actual loss that had been made. Some of their investments were depreciated, while others were appreciated. He regarded the depreciation as temporary. If in the course of their transactions actual losses occurred, they would write them off. The motion was carried; and the proceedings closed with a vote of thanks to the Chairman.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 388.)

Issue.	Share	When ex-Dividend.	Dividend on Div. Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	,,	7½	Do. 7 p. c.	10	11½—12½	..	6 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105—107	..	4 13 5
100,000	20	27 Nov.	8	Bahia, Limited	20	12—14	..	11 8 6
200,000	5	12 Nov.	7½	Bombay, Limited	5	6½—6¾	—¼	5 11 1
40,000	5	,,	7½	Do. New	4	4¾—5¼	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	205–215*	+1	5 14 1
150,000	,,	,,	9½	Do. New	100	153–158*	+½	5 17 1
220,000	20	16 Sept	11½	Brighton & Hove Original	20	40—42	..	5 9 6
888,500	Stck.	16 Sept.	5	Bristol	100	98—103	..	4 17 1
320,000	20	15 Oct.	11½	British	20	43—45	..	5 0 0
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	10	19—20*	+1	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	14—15*	+1	5 13 4
328,750	10		—	Buenos Ayres (New) Limited	10	5—6	..	—
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	93—96	..	6 5 0
150,000	20	26 Feb.	8	Cagliari, Limited	20	24—26*	..	6 3 1
550,000	Stck.	15 Oct.	12*a*	Commercial, Old Stock	100	240—250	..	5 4 0
165,000	,,	,,	10*a*	Do. New do.	100	190—195	..	5 2 7
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
800,000	Stck.	30 Dec.	13	Continental Union, Limited	100	225—230	..	5 13 0
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	185—195	..	5 2 7
73,000	Stck.	16 Sept.	10	Crystal Palace District	100	190—200	..	5 0 0
486,090	10	29 Jan.	10	European, Limited	10	19—20	..	5 0 0
354,060	10	,,	10	Do. Partly paid	7½	14—15	..	5 0 0
5,470,820	Stck.	12 Feb.	12	Gaslight & Coke, A, Ordinary	100	214—218	..	5 10 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	94—97	..	4 2 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	245—250	..	4 0 0
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	116—121	..	4 2 9
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	169—174	..	4 6 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	148—153	..	4 11 6
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	241—246	..	4 1 3
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	145—150	..	4 0 0
1,061,150	,,	11 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113—116	+1	3 9 0
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	118—123	..	3 13 2
908,000	,,	,,	6	Do. 6 p. c. do	100	163—168	..	3 11 5
3,800,000	Stck.	12 Nov.	12	Imperial Continental	100	222—226	+1½	5 6 2
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4—4½	..	6 13 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	108—110	..	4 10 11
541,920	20	27 Nov.	6½	Monte Video, Limited	20	15—16	..	8 2 6
150,000	5	27 Nov.	10	Oriental, Limited	5	8½—9	..	5 11 1
150,000	5	30 Sept.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2½—3½	..	—
420,000	100	3 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	1 Dec.	6	2nd Do.	100	100—105	..	5 14 3
150,000	10	15 Oct.	10	San Paulo, Limited	10	9½—10½	..	9 10 6
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	266–271*	+1½	5 14 5
1,350,000	,,	,,	12	Do. B do.	100	221–226*	+1	5 6 2
200,000	,,	,,	13	Do. C do.	100	232–237*	+½	5 9 8
225,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	138—143	..	3 10 0
600,000	Stck.	16 Sept.	11½	Tottenham & Edm'nton, Orig.	100	—	..	—
				WATER COMPANIES.				
729,331	Stck.	30 Dec.	10	Chelsea, Ordinary	100	256—261	..	3 16 7
1,720,560	Stck.	15 Oct.	8	East London, Ordinary	100	204—209	..	3 16 7
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	136—140	..	3 4 3
700,000	50	11 Dec.	8	Grand Junction	50	99—103	..	3 17 8
708,000	Stck.	12 Feb.	10½	Kent	100	263—268	..	3 18 4
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	225—230	..	4 2 7
406,200	100	,,	7½	Do. 7½ p. c. max.	100	185—194	..	3 17 4
260,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	330—335	—2½	3 22 4
1,000,000	Stck.	29 Jan.	4	Do. 4 p. c. Deb. Stk	100	123—126	..	3 3 6
902,300	Stck.	30 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	146—150	..	4 6 8
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	140—145	..	4 9 8
1,155,066	Stck.	11 Dec.	10	West Middlesex	100	244—249	—1	4 0 4
						*Ex div.		

a Next dividends will be at this rate.

Smokeless London.—Writing on this subject, Mr. T. Fletcher says: If your correspondent "C. A.," who last week wrote such a sweeping condemnation of gas coke as a fuel, will use it mixed with coal in about equal proportions, he will very soon alter his opinion. A mixture of gas coke and coal is as near an ideal fuel as we are likely to get; and if the gas companies would persistently make this known, coke would no longer be a drug in the market.

A Large Steel Pipe Contract.—Tenders were some time ago invited for supplying 82 miles of steel main piping (5200 tons) in connection with the great water-works at Beetaloo, in South Australia; and the tender accepted, amounting to £130,000, is £21,900 below the official estimate. The water-works in question supply the important mining townships of Moonta and Wallaroo, and the piping will convey 600 million gallons of water from the Beetaloo reservoir every year.

The Worcestershire County Council and the Birmingham Water Scheme.—Two reports dealing with the Birmingham Corporation Water Bill recently came before the Worcestershire County Council. The General Purposes Committee recommended that a Special Committee should be appointed to consider the Bill; while the Sanitary Committee, in the course of their report, said they had ascertained from inquiry that the water supplies of the following places might be greatly improved by recourse to the Birmingham scheme: Tenbury, Bewdley, Blakedown, Lower Hagley (near the railway station), and Adam's Hill, Clent Hill and Quinton, Bristnall Fields, Warley, and certain places within the Kidderminster and King's Norton Rural Sanitary districts respectively. They were of opinion that provision should be made in the Bill to compel the Corporation to supply all sanitary or other authorities with water within a distance of (say) 15 miles of the aqueduct, at a fixed charge for the water, to be named in the Bill; and that the Corporation should also be compelled to supply any sanitary or other authority within 20 miles of the aqueduct who were willing to pay the cost of the necessary connecting work at the same rate for the water supplied. The Committee also considered that the terms as to the compensation water to be given by the Corporation should be so liberally framed as not to be used as a precedent in any future proposal to take water from the Severn watershed that would injuriously affect the sanitary interests of the county. While the Committee did not in any way pledge themselves to the details or figures, they thought that some such basis of compensation as that suggested by the Chairman of the Severn Fishery Board to the Chief Inspector of Fisheries, would be a convenient one (*ante*, p. 78); and they recommended the Council to authorize the General Purposes Committee to take such steps as may be necessary to secure these objects. The Committee had learnt that a Royal Commission was about to inquire into the water supply of London, and to report on the available sources of supply for the Metropolis. They recommended that a letter be addressed to the Local Government Board inquiring whether this was correct; and, if so, whether the inquiry would extend to the Severn watershed as a possible source of supply. Should this be the case, they thought that some representative of the Severn watershed should be placed upon the Commission; and they recommended that this should be brought to the notice of the Local Government Board. It was ordered that the General Purposes Committee should watch the Bill till the new County Council came into being.

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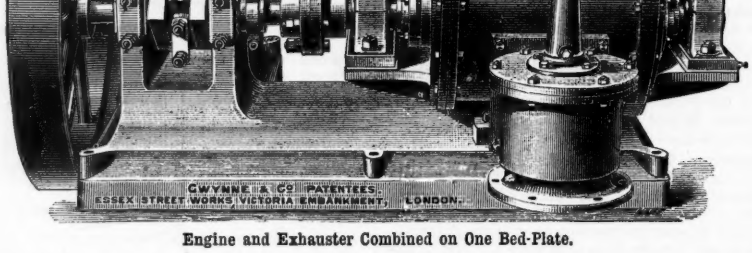

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SECRETARY and Superintendent re- quired. Salary, £50 per annum.
The candidate selected will be permitted to follow any other occupation; and he only will be advised on the 19th of March inst. of his appointment. Anyone having a practical knowledge of the management of Gas-Works, and of keeping Companies Accounts, will be preferred.
Applications, in candidate's own handwriting, stating age, experience, &c., accompanied by copies of two recent testimonials, to be addressed to THOMAS HOLLAND, Esq., MALVERN LINK.

SLIGO GAS COMPANY.

WANTED, a good second-hand Ex- HAUSTER, 6000 to 10,000 feet per hour.
C. B. TULLY,
Engineer and Secretary.

SLIGO GAS COMPANY.

THE above Company invite Tenders for their surplus TAR; about 100 tons.
Particulars as to freights and shipment on application to
C. B. TULLY,
Engineer and Secretary.

RICHMOND (SURREY) GAS COMPANY.

FOR SALE—The Directors invite Offers for a CAST-IRON ANNULAR CONDENSER, suitable for a make up to 750,000 cubic feet per day, which has been taken down to make room for Extensions.
The Condenser is complete with 12-inch Connections and Valves, and will be loaded into Railway-Trucks for removal.
THOMAS MAY,
Engineer and Manager.
Feb. 23, 1892.

SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantity at highest market prices, or contracts for the year.
For prices and terms apply Botolph House, Eastcheap, LONDON, EC.

DRAWINGS, Tracings, Specifications, Quantities, &c., prepared by an experienced Engineering Draughtsman. Plans of Works made, copied, or enlarged. Blue copies made. Illuminated Addresses in first-class style. Writings of all kinds, Engrossments, &c.
Address J. L. FEATHERSTONE 178, Fentiman Road, LONDON, S.W.

OXIDE OF IRON FOR GAS PURIFICATION.

JAMES GORDON & Co., Brokers, can offer Cargoes of good quality; also 300 tons of SPENT OXIDE.
Samples and price on application.
Address Borough Buildings, 7, Rumford Street, LIVERPOOL.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors, for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."

TO BE SOLD—The Stock-in-Trade and GOODWILL of a Gas Governor Maker and Mill Furnisher.
Apply to JAMES HARDMAN AND Co., 9, Church Terrace, OLDHAM.

IMPORTANT SALE BY PRIVATE CONTRACT.

A GAS-WORKS in the Midland Counties, recently erected, and fitted complete with all necessary modern Machinery, including Retort-House, Engine and Exhauster, Dwelling-House and Freehold Land, and 2¾ miles of Main. Situate on the Main Line, and in the vicinity of a large Factory, and a rising Population of 2000.
The district being secured by Parliamentary Powers, this forms an exceptional opportunity well worthy of attention.
Apply, by letter, in first instance, to No. 2074, care of Mr. King 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, cheap—Two Gasholders, 35 ft. diameter by 12 ft. deep. Capacity, 11,500 cubic feet each. Also various other larger sizes.
Two PURIFIERS, 24 ft. by 16 ft. by 4 ft. 6 in. deep, with Valves and Connections.
Four PURIFIERS in a group, 16 ft. by 12 ft. by 3 ft. 9 in. deep, 12-inch Centre-Valve and Connections. Also various other sizes.
WASHERS, from 500,000 to 250,000 feet per diem.
CONDENSERS, from 500,000 to 10,000 feet per diem.
EXHAUSTERS, from 120,000 to 5000 feet per hour.
STATION METERS, from 100,000 to 1500 ft. per hour.
Would erect any of the above, and make practically equal to new.
Inquiries invited for any second-hand Gas Plant.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

NOW READY. PRICE ONE SHILLING.

METROPOLITAN WATER SUPPLY.

CONSIDERATIONS AFFECTING THE

ADEQUACY AND CONTROL

OF THE

WATER SUPPLY TO THE METROPOLIS.

BY

E. H. STEVENSON and E. K. BURSTALL, M.M. Inst. C. E.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

PADIHAM AND HAPTON LOCAL BOARD.

THE Gas Committee invite Tenders for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at the Padiham Gas-Works for One year, commencing March 26, 1892.

Particulars may be obtained from the Manager.

Endorsed tenders must be sent to me not later than Saturday, March 12.

J. R. SMITH,
Clerk to the Board.

Local Board Offices, Padiham,
Feb. 23, 1892.

COUNTY BOROUGH OF BURNLEY.

TO TAR DISTILLERS.

THE Gas Committee of the Corporation of Burnley invite TENDERS for the purchase of the TAR produced at their Gas-Works during a period of One, Two, or Three years from the 26th of March, 1892.

Approximate quantity produced annually, 3000 tons.

The Tar will be delivered into the Contractor's Boats at the Gas-Works Wharf, on the Leeds and Liverpool Canal.

Tenders, under seal, endorsed "Tender for Tar," stating price per ton, to be sent in, addressed to the Chairman of the Gas Committee, Town Clerk's Office, Town Hall, Burnley, on or before Wednesday, the 9th of March, 1892.

By order,
R. E. FOX,
Town Clerk.

Town Hall, Burnley,
Feb. 20, 1892.

SHEFFIELD UNITED GASLIGHT COMPANY.

EFFINGHAM STREET STATION.
TO IRONFOUNDERS, ETC.

THE Directors of this Company invite TENDERS for the supply and erection of Six PURIFIERS, each 34 ft. by 19 ft., together with Wrought-Iron Covers, Lifting Gear, Valves, and Connections; and also Cast-Iron Girders and Columns to form Floor for carrying the same.

Drawings and Specification may be seen, and Bill of Quantities obtained, upon application to the Engineer, Mr. Fletcher W. Stevenson.

The Directors do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Tender for Purifiers," and addressed to the undersigned, must be delivered at the Company's Offices, by post, not later than Saturday, March 5 next.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
Feb. 12, 1892.

SHEFFIELD UNITED GASLIGHT COMPANY.

GRIMESTHORPE STATION.
CONTRACT No. 6.
TO GASHOLDER MANUFACTURERS.

THE Directors of this Company invite TENDERS for the construction and erection of a FOUR-LIFT GASHOLDER and WROUGHT-IRON GUIDE-FRAMING. The Lifts of the Gasholder will average 145 feet diameter by 29 feet deep.

TENDERS are also invited for a second GASHOLDER, which will be in all respects similar to the first.

The first Gasholder to be completed by June 30, 1893; and the second, by Aug. 31, 1893.

Drawings and Specification may be seen, and Bill of Quantities obtained, upon application to the Engineer, Mr. Fletcher W. Stevenson.

The Directors do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Tender for Gasholders," and addressed to the undersigned, must be delivered at the Company's Offices, by post, not later than Saturday, March 5 next.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
Feb. 12, 1892.

SHEFFIELD UNITED GASLIGHT COMPANY.

GRIMESTHORPE STATION.
CONTRACT No. 7.

THE Directors of this Company invite TENDERS for the construction of a CONCRETE and BRICK GASHOLDER TANK (No. 2), 152 feet diameter and 30 feet deep, &c.

Drawings and Specification may be seen, and Bill of Quantities obtained, upon application to the Engineer, Mr. Fletcher W. Stevenson.

The Directors do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Tender for Gasholder Tank," and addressed to the undersigned, must be delivered at the Company's Offices, by post, not later than Saturday, March 5 next.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
Feb. 12, 1892.

SHEFFIELD UNITED GASLIGHT COMPANY.

GRIMESTHORPE STATION.
CONTRACT No. 8.
TO IRONFOUNDERS, ETC.

THE Directors of this Company invite TENDERS for the supply and delivery of IRON-WORK required in the construction of No. 2 Gasholder Tank and Framing.

Bill of Quantities may be obtained, and the Drawings may be seen, at the Company's Offices, upon application to the Engineer, Mr. Fletcher W. Stevenson.

The Directors do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Tender for No. 2 Gasholder Tank," and addressed to the undersigned, must be delivered at the Company's Offices, by post, not later than Saturday, March 5 next.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
Feb. 12, 1892.

BOROUGH OF DROITWICH.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply and erection of a new EXHAUSTER for 10,500 cubic feet of gas per hour, with Horizontal Engine combined, together with the necessary Connections required.

Particulars may be obtained on application to the Gas Manager.

Persons tendering must submit with their tender detailed Drawings and Specification.

Sealed tenders, endorsed "Exhauster," are to be sent to the undersigned on or before Saturday, the 19th day of March next.

The Committee do not bind themselves to accept the lowest or any tender, nor will they pay any expense or charge relating to the making or delivery of the same.

S. JOHN TOMBS,
Town Clerk.

Town Hall, Droitwich,
Feb. 22, 1892.

COUNTY BOROUGH OF WIGAN.

THE Gas Committee invite Tenders as follows:—

Contract No. 1. Cast Mains and Connections.
" No. 2. Wrought-Iron Tube and Fittings.
" No. 3. Brass Tube and Fittings.
" No. 4. Lead Pipe and Pig Lead.
" No. 5. Wet and Dry Gas-Meters.
" No. 6. Fire-Clay Goods—*i.e.*, Retorts, &c.

The contracts will be for One year, commencing on the 1st of April next, and ending on the 31st of March, 1893.

Forms of tender to be obtained from the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

Tenders, sealed, and endorsed with the name of Articles tendered for, to be delivered to the Town Clerk, Town Hall, Wigan, on or before Monday, the 14th of March next.

JOS. TIMMINS,
Engineer.

Gas-Works, Wigan,
Feb. 26, 1892.

BOLTON CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Bolton Corporation Gas Department are prepared to receive TENDERS for the purchase of TAR, to be produced at their Gas-Works, for the periods of One, Two, or Three years, dating from the 26th of March.

Approximate quantity, about 5000 tons yearly.

The Tar will be delivered into Contractors' Tanks at the Craddock Lane and Bullfield Sidings, on the Lancashire and Yorkshire Railway, Bolton.

Tenders, under seal, endorsed "Tender for Tar," and stating price per ton of 2240 lbs., and terms, to be addressed to Mr. Alderman Miles, Chairman of the Gas Department, and delivered at the Gas Offices, Bolton, on or before Wednesday, the 9th of March.

The highest or any tender not necessarily accepted.

By order,
R. G. HINNELL,
Town Clerk.

Town Hall, Bolton,
Feb. 26, 1892.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)

TO ENGINEERS, ETC.

THE Gas Committee are prepared to receive TENDERS for the following MACHINERY and PLANT, viz.:—

No. 1.—WASHERS. One of 2,000,000 cubic feet capacity for the Portwood Works, and one of 800,000 feet capacity for the Heaton Lane Works.

No. 2.—EXHAUSTER of 70,000 cubic feet per hour capacity for the Portwood Works, with Horizontal Engine for same.

No. 3.—GOVERNORS. Two 18-inch Station Governors for the Portwood Works.

Full details and all information can be obtained on application to the Engineer, Mr. S. Meunier, Millgate Gas-Works, Stockport.

Tenders, to be endorsed and addressed to the Chairman of the Gas Committee, to be sent in on or before March 17 ensuing.

The Committee do not bind themselves to accept the lowest or any tender.

The resolution of the Council that Contractors will be expected to pay the average rate of wages paid in the district will apply to this contract.

By order,
WALTER HYDE,
Town Clerk.

Stockport, Feb. 29, 1892.

BY PUBLIC AUCTION.

THE Llanberis Gas-Works will be offered FOR SALE as a going concern, at the Royal Hotel, Carnarvon, on March the 5th next, at 1.30 p.m. Freehold.

For particulars apply to the Gas-Works, LLANBERIS.

BRENTFORD GAS COMPANY.

SALE BY TENDER OF £30,000 NEW STOCK, 1881.

IN Pursuance of the Brentford Gas Order, 1881, NOTICE IS HEREBY GIVEN that it is the intention of the Directors of this Company to SELL by TENDER, £30,000 of NEW STOCK, 1881, of the Company, to be paid up in full on or before the 1st day of April next, such Stock being a portion of additional Capital authorized to be raised by Resolutions passed at an Ordinary Meeting of Proprietors, held on the 21st day of February, 1890, under the powers of the above mentioned Order.

Particulars and conditions of tender may be obtained on application at this Office, and sealed tenders must be sent in not later than Twelve o'clock Noon on Monday, the 14th day of March next.

By order,
WM. CROXFORD, Secretary

Office, Brentford Gas Company, Brentford,
Feb. 15, 1892.

COCKERMOUTH LOCAL BOARD.

THE Gas Committee invite Tenders for the Surplus TAR and AMMONIACAL LIQUOR to be produced at their Works during the Twelve months commencing the 1st of April next.

Tenders, endorsed "Tar and Liquor," to be sent in not later than the 3rd of March next.

ER W. SMITH,
Manager.

Feb. 19, 1892.

FYLDE WATER-WORKS COMPANY.

£20,000 FOUR PER CENT. PREFERENCE STOCK, 1891.

THE Directors of the Fylde Water-Works Company give Notice that they are prepared to receive, not later than Monday, the 7th of March, 1892, sealed TENDERS for £20,000 FOUR PER CENT. PREFERENCE STOCK, 1891, authorized to be raised by a Resolution passed at the Half-Yearly General Meeting of Stockholders, held on the 22nd of October, 1891, in pursuance, and under the provisions of, the Fylde Water Act, 1891.

The Stock will be sold in lots of £100 each. Applicants may tender for more than one lot.

The Stock, together with the Premium thereon, to be paid for on or before the 31st of March, 1892. Dividend will accrue from the day of payment of the purchase-money, and will be payable half yearly, about the end of April and October.

The district supplied with Water by the Company includes the Towns of Blackpool, Fleetwood, Lytham, St. Anne's-on-the-Sea, Kirkham, Poulton-le-Fylde, Garstang, and about twenty Villages in the district of the Fylde, Lancashire.

The Capital now offered is required for the extension and enlargement of the Company's Works, rendered necessary by the rapidly-increasing consumption of water in this health-restoring district.

The paid-up capital of the Company is as follows viz.:—

Consolidated Stock "A" £60,000 0 0
(Maximum Dividend of 10 per cent. per annum paid last half year.)
Consolidated Stock "B" £137,042 8 0
(Maximum Dividend of 7 per cent. per annum paid last half year.)
Four Per Cent. Debenture Stock . £9,251 11 2
Loans £39,689 0 0
Four Per Cent. Preference Stock, 1891 £20,000 0 0
(The Four Per Cent. Preference Stock, 1891, takes precedence of the whole of the Consolidated Stocks "A" and "B.")

For Form of Tender and other particulars apply to

C. ARTHUR,
Secretary.

Head Office, Kirkham, Lancashire,
Feb. 5, 1892.

P.S.—The Company are also prepared to receive Loans to a limited amount at 3½ per cent. per annum, for Three, Five, or Seven years. Interest payable on the 1st of January and the 1st of July.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

Price: 10s. *per* 100; £1 2s. 6d. *for* 250; £2 *for* 500; £3 15s. *per* 1000. *Specimen copy (by post),* 4d.

The Use and Value of

Sulphate of Ammonia as Manure.

BY

WILLIAM ARNOLD, F.S.I.,

Land and Estate Agent; Rating Surveyor and Valuer; Chairman of the Tamworth Gaslight and Coke Company.

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Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.,

Chemist and Superintending Gas Examiner to the London County Council.

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Now Ready, Price 6s., Bound in Cloth.

THE CHEMISTRY OF ILLUMINATING GAS,

By

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This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation Condensation; and Purification.

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TROTTER, HAINES, & CORBETT,
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FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

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Cannel and Gas Coal Merchants,
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GLASGOW.

MEIKLEJOHN'S PATENT
Improved Slide-Valve Anti-Dip.
Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.
Is cheap and easily fixed to any form of main.
Will be found the most efficient appliance of the kind yet introduced.
Further particulars and price from
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(Late N. Meiklejohn, Longwood.)

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Special experience in Gas and Ammonia Plant.

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MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.
TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
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Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

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QUOTATIONS ON APPLICATION TO
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LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

TAR AND LIQUOR PURCHASED.
JOHN CLARKSON MAJOR,
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Tar Distiller and Manufacturing Chemist,
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REGENERATIVE FURNACES.
Unsurpassed in
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COKE BREAKERS,
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New Design, with two Cutting Rollers, making less Breeze than their old pattern.
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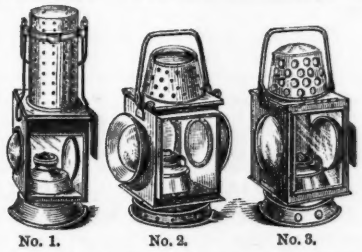
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The best Regenerative Lamp in the Market.
Special quotations to Gas Companies.

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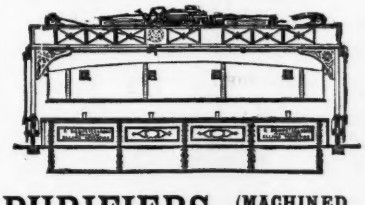
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ELLAND.

For **FIRE-BRICKS,** the most durable for **GAS-FURNACES,**
Address
JAMES WHITE & Co., Limited,
ALBERT WORKS, WIDNES.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.
Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

CAST-IRON PIPES
FOR GAS AND WATER.
Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.
VALVES
FOR GAS, WATER, AND STEAM
TELEGRAMS: "PIPES GLASGOW."
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REAL SILKSTONE GAS COAL
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Yield of Gas per ton . . . 13,215 Cub. Ft.
Illuminating Power . . . 37·56 Candles.

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Shipping Ports: All the principal Scotch Ports.

HOLMSIDE GAS COALS.

(Wrought out of Holmside and South Moor Collieries.)

PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, the Ipswich Gas Company, and by many other Gas Companies both at Home and Abroad.

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97 WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

For Prices and complete Analysis, apply to

YOUNG, DANCE, & CO.,
COAL OWNERS, NEWCASTLE-ON-TYNE.
Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.
TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE NO. 200.
LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.
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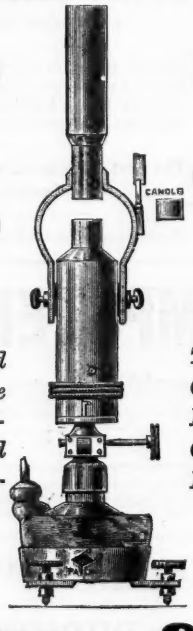

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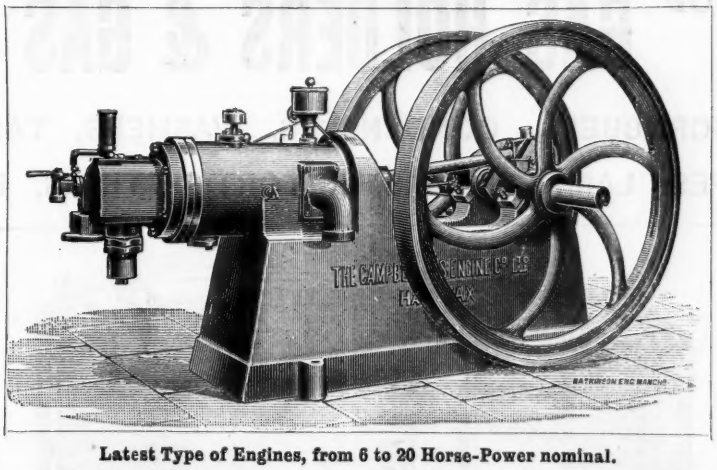

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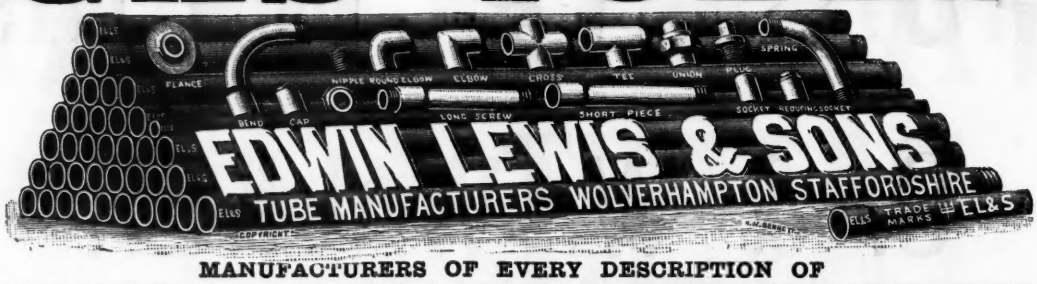

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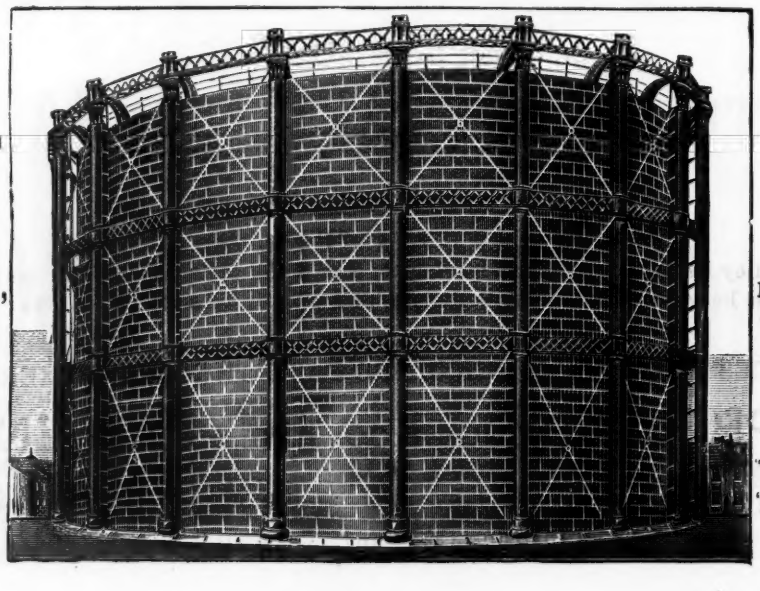

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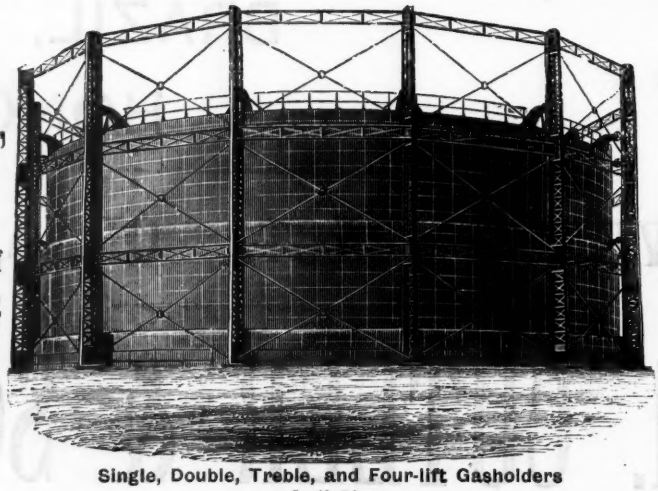

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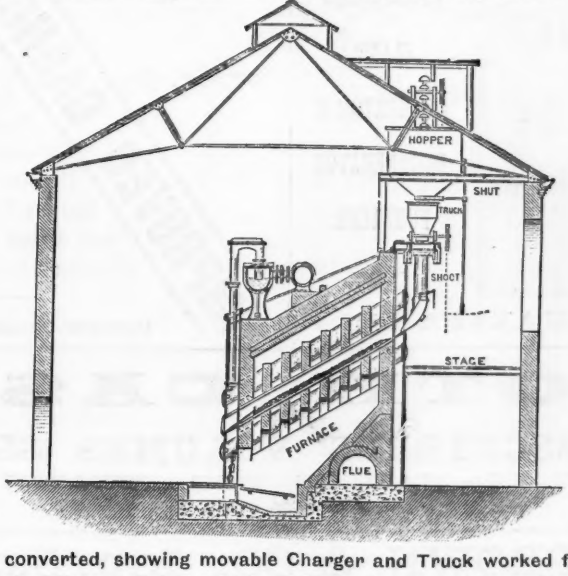

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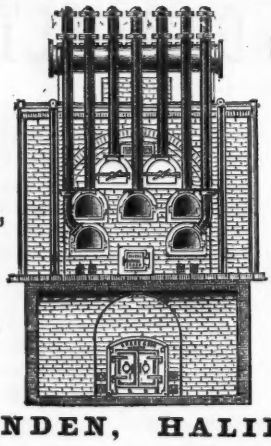

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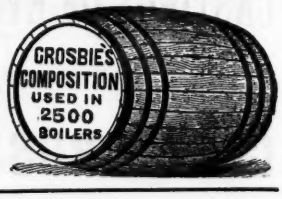

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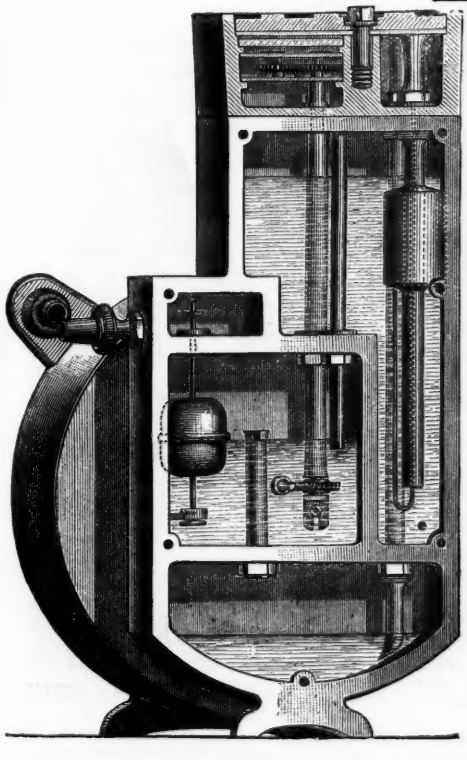

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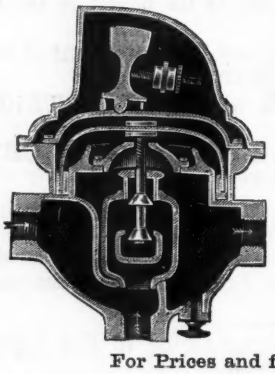

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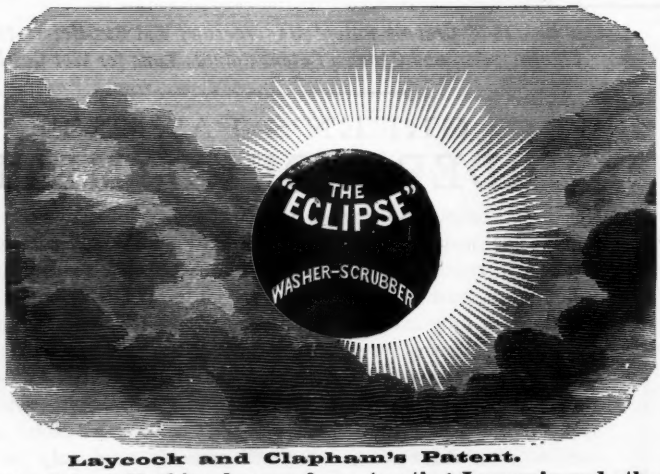

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